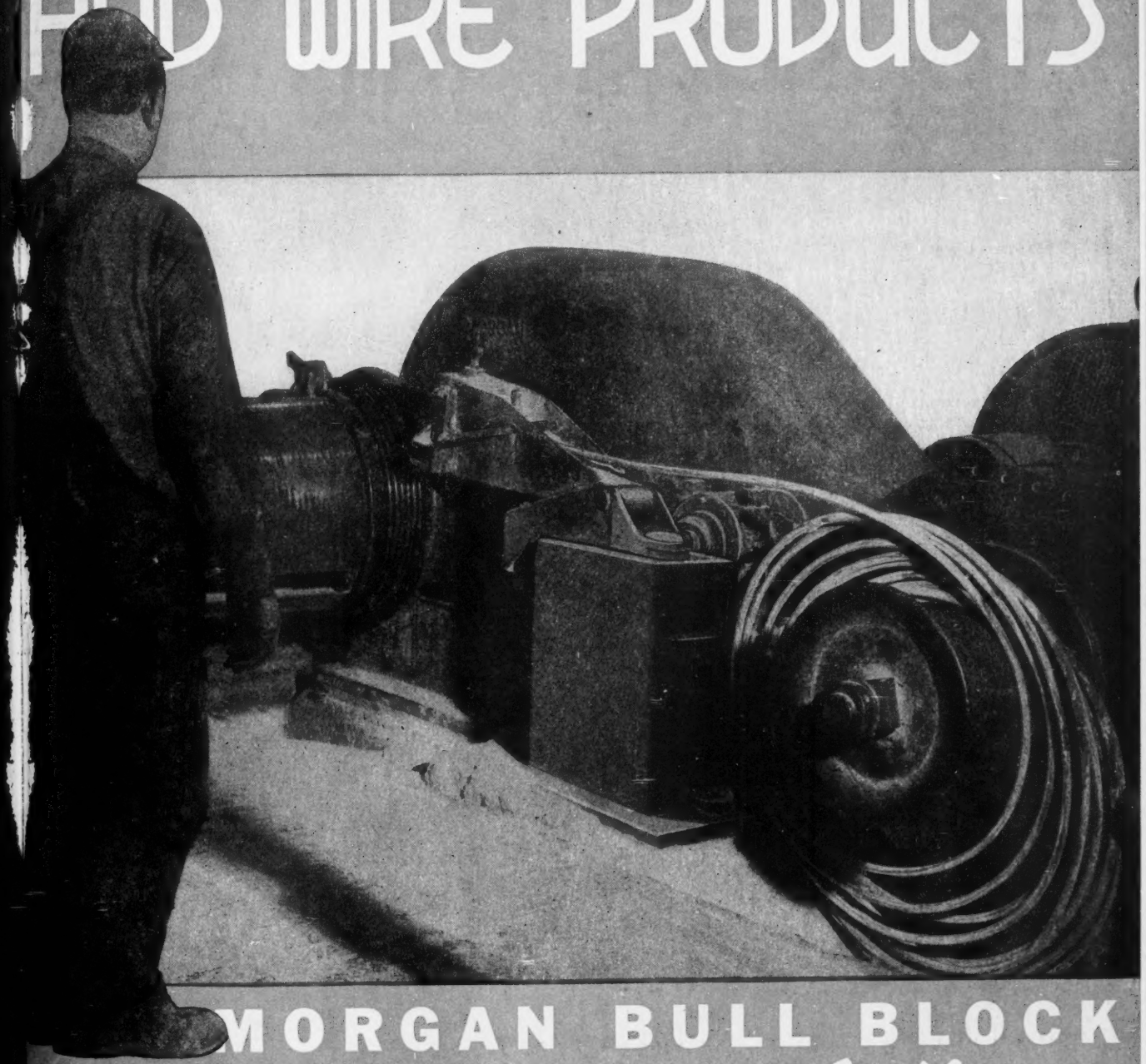
WIRE AND WIRE PRODUCTS

AUGUST 1945

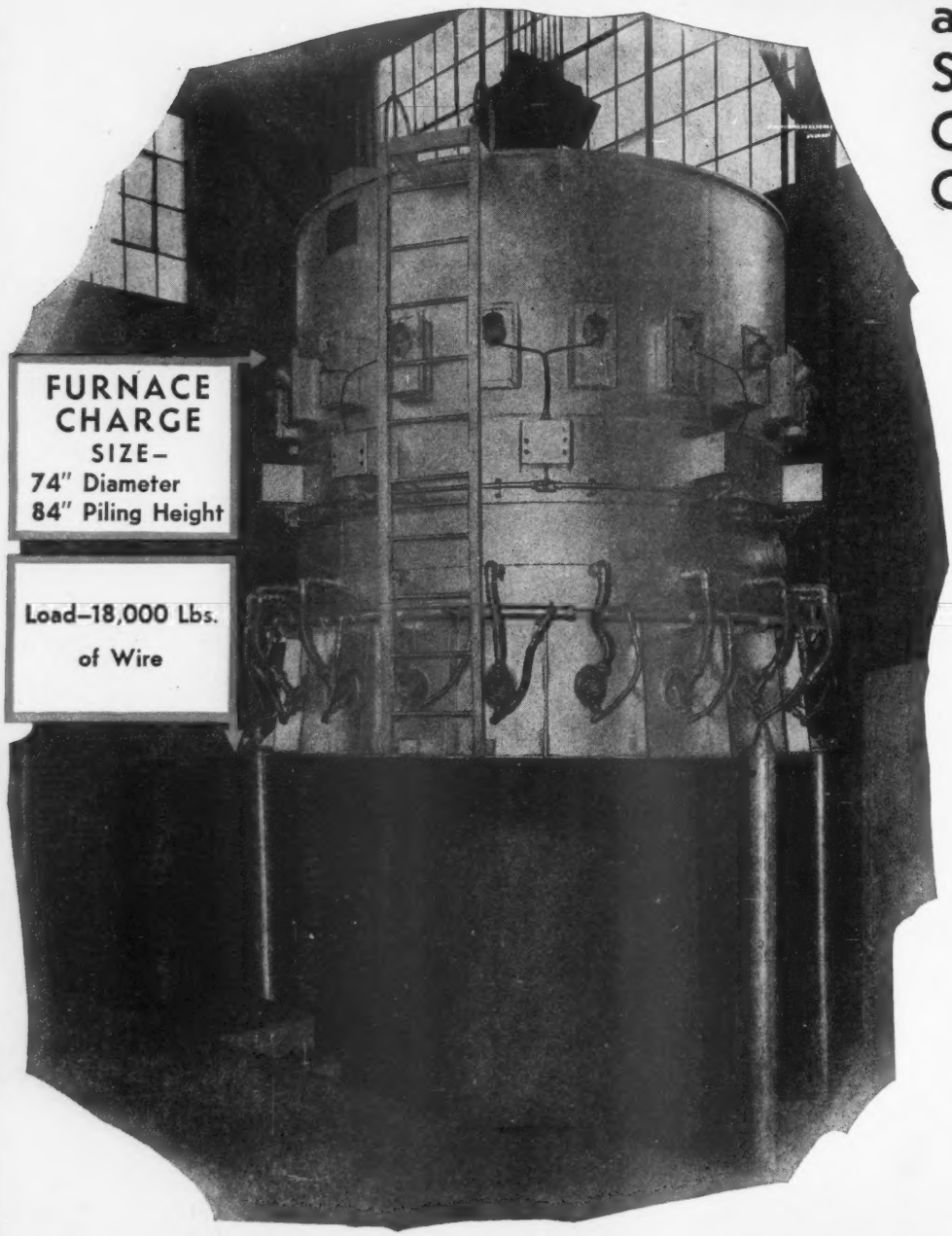


MORGAN BULL BLOCK *in Action*

MORGAN CONSTRUCTION COMPANY
WORCESTER • MASSACHUSETTS

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

This WILSON BELL TYPE *Furnace*
IS BEING LOWERED OVER ANOTHER HEAVY CHARGE at the WILSON STEEL & WIRE COMPANY'S Chicago Plant.



SINCE this inst
lation was made,
additional units ha
been ordered
other wire produce

THE highest yie
per hour at the lo
est fuel rate–
Average Load–18,000 L
Average Time – 8 Hours.
Average Fuel Rate –
1,100,000 BTU To

The Wilson Annealing Unit is covered by Patents Nos. 1,952,402, 2,068,477, 2,078,356, 2,081,612, 2,089,843, and other patents pending.

ENGINEERED AND CONSTRUCTED BY THE

Lee Wilson ENGINEERING Co., Inc.
20005 West Lake Road CLEVELAND, OHIO
Telephone ACademy 4670

INDUSTRIAL FURNACES ★ RADIANT TUBE HEATING ★ HEAT TREATING PROCESS

When you draw fine steel wire—every day, every hour of extra die life means increased production, extra savings, and lower die cost per ton drawn.

Developed especially for this exacting operation, Carboloy Grade 999 is ultra-hard, ultra wear-resistant. It stays on the job—holds size—for long, continuous periods of use.

On your next run of fine steel wire, try Carboloy R-1 dies with Grade 999. You'll find them "tops" in performance and a real money saver on die cost per ton. Stocked for prompt delivery.

CARBOLOY

(Trademark) **CEMENTED CARBIDES**

COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL

CARBOLOY COMPANY, INC., 11171 E. 8 Mile St., Detroit 32, Michigan

Chicago • Cleveland • Detroit • Houston • Los Angeles • Milwaukee • Newark • Philadelphia • Pittsburgh • Thomaston, Conn.

Authorized Distributors: Hartley Wire Die Co., Thomaston, Conn. • Michigan Wire Die Co., Detroit, Michigan

Of the many little devices in everyday use that save time and make life more convenient, it's surprising how many are made of wire, or depend on wire in some way.

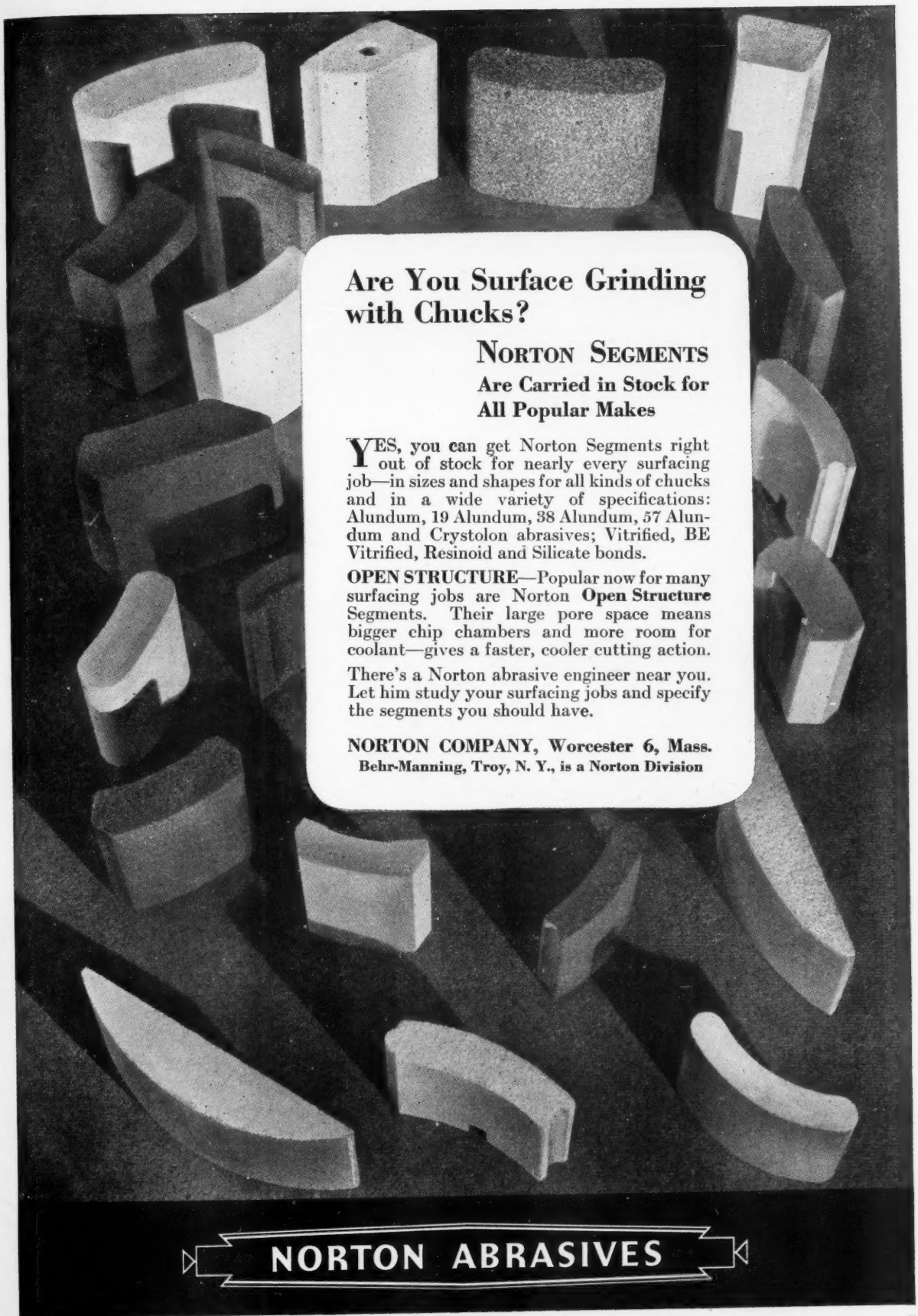
Perhaps you're planning to bring out some new postwar gadget for everyday use that will be made of wire. It may be a simple little item for the dime-store trade, or something more elaborate. Whatever it is, if it calls for wire, Bethlehem's complete line of manufacturers' wire is pretty certain to include wire of the kind and size you are going to need.

Bethlehem wire is top-quality wire in every respect. It is made from superior grades of steel, under the critical eyes of Bethlehem metallurgists. As soon as war needs have been completely satisfied, Bethlehem wire in a full range of sizes, tempers and finishes will again be available in large quantities for normal peacetime uses.

★ BETHLEHEM STEEL

★ **BETHLEHEM WIRE** ★

Bethlehem Steel Company, General Offices: Bethlehem, Pa. Bethlehem Steel Export Corporation, New York City



Are You Surface Grinding with Chucks?

NORTON SEGMENTS
Are Carried in Stock for All Popular Makes

YES, you can get Norton Segments right out of stock for nearly every surfacing job—in sizes and shapes for all kinds of chucks and in a wide variety of specifications: Alundum, 19 Alundum, 38 Alundum, 57 Alundum and Crystolon abrasives; Vitrified, BE Vitrified, Resinoid and Silicate bonds.

OPEN STRUCTURE—Popular now for many surfacing jobs are Norton **Open Structure** Segments. Their large pore space means bigger chip chambers and more room for coolant—gives a faster, cooler cutting action.

There's a Norton abrasive engineer near you. Let him study your surfacing jobs and specify the segments you should have.

NORTON COMPANY, Worcester 6, Mass.
Behr-Manning, Troy, N. Y., is a Norton Division

NORTON ABRASIVES

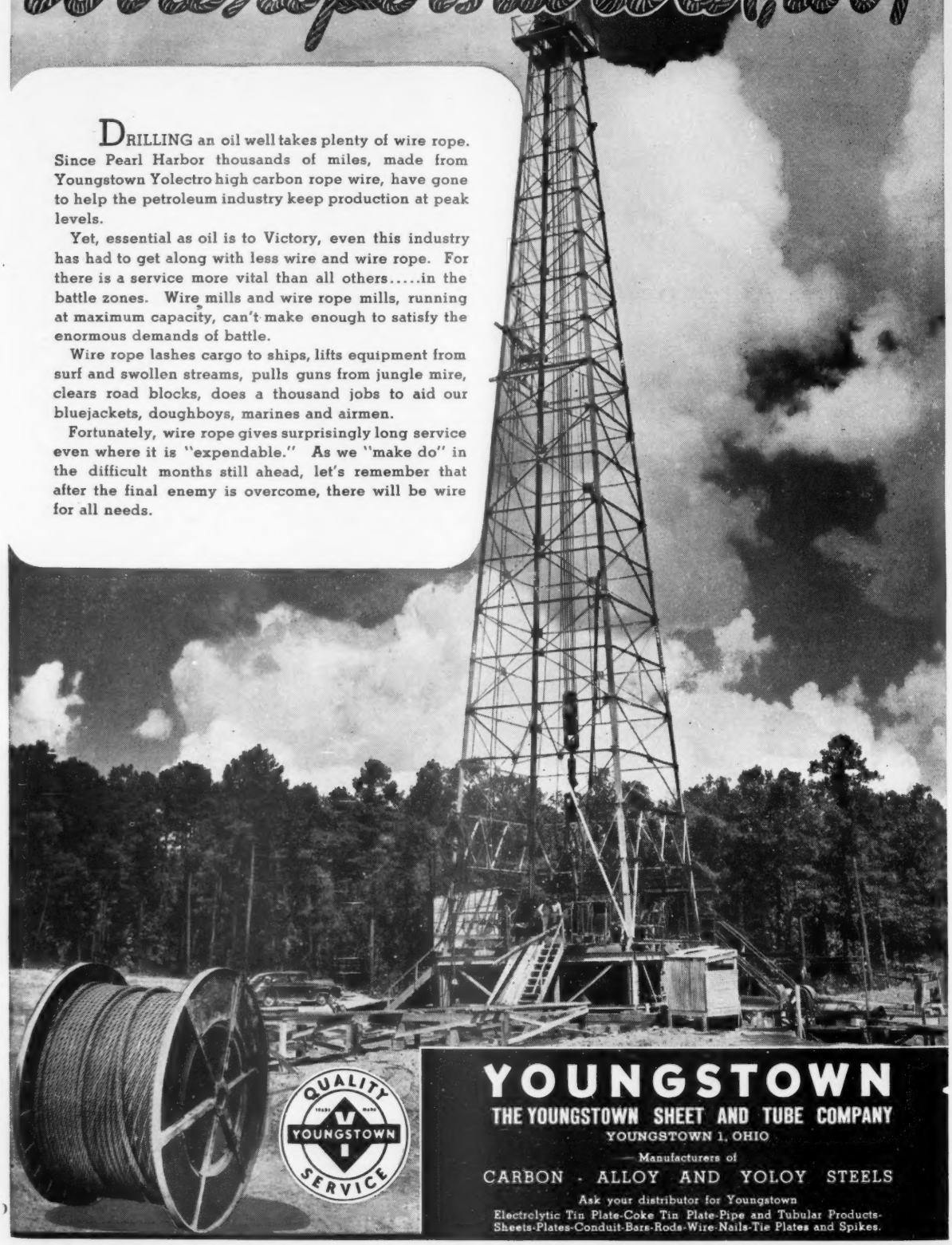
Wire rope is at War, too!

DRILLING an oil well takes plenty of wire rope. Since Pearl Harbor thousands of miles, made from Youngstown Yolectro high carbon rope wire, have gone to help the petroleum industry keep production at peak levels.

Yet, essential as oil is to Victory, even this industry has had to get along with less wire and wire rope. For there is a service more vital than all others.....in the battle zones. Wire mills and wire rope mills, running at maximum capacity, can't make enough to satisfy the enormous demands of battle.

Wire rope lashes cargo to ships, lifts equipment from surf and swollen streams, pulls guns from jungle mire, clears road blocks, does a thousand jobs to aid our bluejackets, doughboys, marines and airmen.

Fortunately, wire rope gives surprisingly long service even where it is "expendable." As we "make do" in the difficult months still ahead, let's remember that after the final enemy is overcome, there will be wire for all needs.



YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN 1, OHIO

Manufacturers of

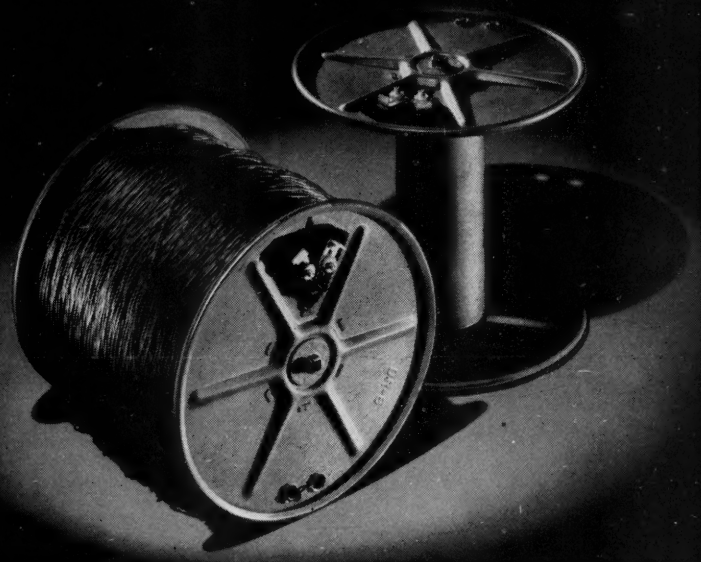
CARBON - ALLOY AND YOLOY STEELS

Ask your distributor for Youngstown

Electrolytic Tin Plate-Coke Tin Plate-Pipe and Tubular Products-Sheets-Plates-Conduit-Bars-Rods-Wire-Nails-Tie Plates and Spikes.

WIRE & WIRE PRODUCTS, Vol 20, No. 8, August, 1945. Executive Office, 300 Main St., Stamford, Conn. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S Spengel, Sec. and Treas. Publication office, 266 Summer St., Stamford, Conn. Subscription price: U. S. $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign $7.50 per year. Entered as second class mail at the Post Office, Stamford, Conn., Feb. 9, 1945, under Act of March 1879.

So much insulation, so little weight...



Assault wire insulated with

Du Pont POLYTHENE

Assault wire is the low-voltage telephone wire laid down by the most advanced troops. Insulated with Du Pont polythene, this wire exceeds the U. S. Army Signal Corps specifications: *weight*—not more than 30 lbs. to the mile; *loss in electrical transmission*—not exceeding 6 decibels per mile after 48 hours' immersion in water. Polythene-insulated wire has a talking range of 10.7 miles when dry, and 6.8 miles when wet. These talking ranges are greater than those accomplished with any insulating material previously used.

POLYTHENE, the versatile Du Pont plastic, has greatly extended the usefulness of assault wire used by the Army. That's because polythene gives better insulation with less weight than any other flexible insulating material.

Polythene's specific gravity is 0.92. Even more important are polythene's excellent electrical properties—plus the fact that these properties change very little over the temperature range from -50°F. to 220°F.

Other important properties of polythene are these: Flexibility and toughness over a wide range of temperatures, low water-absorption (less than 0.0005%); chemical inertness; ease of extrusion at an economical rate of speed.

All polythene now being produced is under WPB allocation. Small quantities for experimental purposes can be obtained upon proper application. Address E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Arlington, N. J.

Buy—and Hold—WAR BONDS

DU PONT
REG. U.S. PAT. OFF.

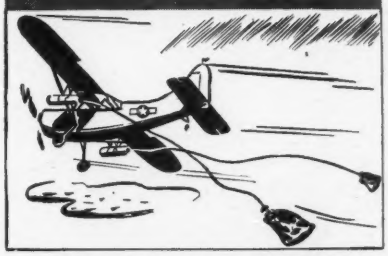
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

IT IS CARRIED

...by G. I. Talking range of assault wire is about 7 miles. Polythene's light weight enables a soldier easily to carry a mile of it on his back.

...or Jeep. When terrain permits, spools of assault wire are sometimes carried on a jeep, unwound as jeep advances.

IT IS LAID FROM



...Plane. This new wire is used in the laying of telephone wire from a plane, traveling at about 110 miles per hour.

...or Bazooka. To carry the wire over streams, swamps, other hazards, even the bazooka has been used to lay assault wire.

FOR *PLASTICS..*

CONSULT *DU PONT*

For Five Generations a Part of the American Scene

Greater Efficiency for Tomorrow's Yarns

PRODUCING insulation yarns for war requirements is one of Cheney Brothers major war duties.

Producing yarns for peacetime applications will, we hope, soon again become an important activity of our mills.

These insulating yarns will have characteristics far beyond anything produced before the war. They will be the results of much time, effort and money expended to take advantage of some particular fiber characteristic for some important war use.

The Electrical Industry will gain by this vast amount of war-stepped-up research work. It will be able to obtain yarns engineered for specific requirements—every one tested and approved by the most rigorous of war experiences.

This is what you may expect tomorrow from Cheney yarns which are being produced today to help win a great war.

There are other important items being produced to win a great war, too. WAR BONDS, for example. You don't have to *wait* to buy 'em either. Get a couple today!

CHENEY YARNS

CHENEY BROTHERS

Quality manufacturers since 1838

350 FIFTH AVENUE, NEW YORK 1, N. Y.

Velvets—Pile Fabrics—Cravats—Upholstery and Decorative Fabrics
Yarns for Industry—Men's Wear Fabrics—Machine Thread—Industrial Fabrics

Sales Offices

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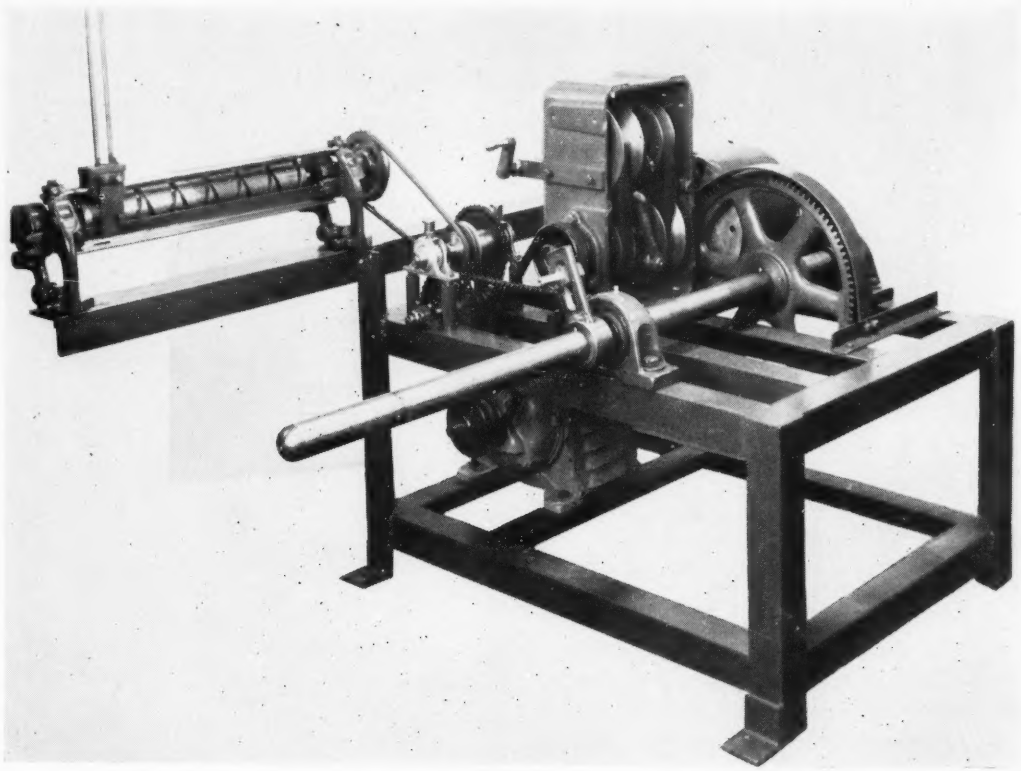
MILLS AT MANCHESTER, CONN.

ALSO AT MANCHESTER, CONNECTICUT, A SUBSIDIARY...PIONEER PARACHUTE COMPANY

Variable Speed Take-Up —

Suitable
For Inspection and Re-Winding Operations.



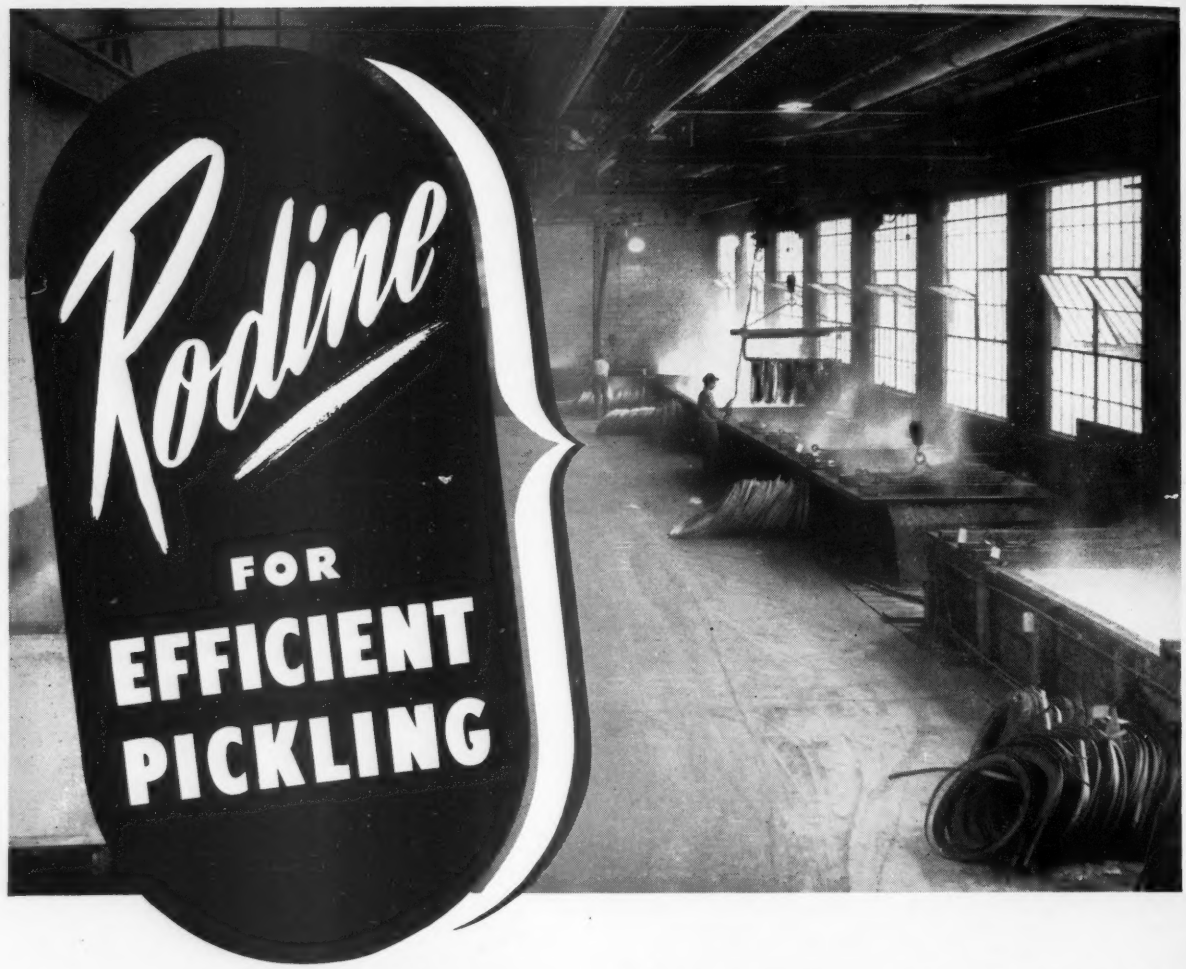
This machine is primarily designed for automatic spark testing. It also can be used for any sort of winding, particularly for inspection work, and any type of work where a variable speed and instantaneous stopping is required.

The machine consists of a poly-phase motor driving a variable speed transmission which is mounted on ball bearings, capable of running up to 3600 r.p.m., having a ratio of 16 to 1. On the output shaft of the variable speed transmission is a pinion gear which drives the main gear of the take-up which is mounted on two ball bearing pillow blocks. On the output shaft of the speed reducer is also mounted a solenoid brake. In this manner the braking torgue increases proportionately with the speed and there is more braking at higher speeds. The braking in this manner eliminates the shock on the speed reducer and belts.

Please Address Inquiries to

R. L. DAVIS ELECTRIC CO.

WALLINGFORD, CONN.



The prevention of Pickle Brittleness is but one of the many reasons why Rodine is so generally used throughout the pickling industry.

RODINE minimizes embrittlement by confining the action of the pickling acid to the removal of scale thus minimizing acid attack on clean metal and the evolution of hydrogen that is responsible for this and other pickling troubles.

RODINE — a selective inhibitor — effects material savings in pickling. The saving in increased tonnage of pickled metal and in the amount of acid consumed far exceeds the cost of the Rodine used. This will be a material aid to profitable production for the postwar production.

Below are a few advantages of the RODINE inhibited pickle bath:

- Less acid required to pickle a given weight of metal
- Less metal wasted in pickling
- Less overpickling
- Less embrittlement
- Less rejections for bad pickling
- Less coating metal needed
- There are many others!

There are types of RODINE suited to the varying pickling problems. The experience of ACP Technicians is at your service to recommend the Rodine application best suited to your needs.

"Efficient Pickling," a new 75-page bulletin of valuable information for picklers, will be sent free on request. Address Dept.

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

AMERICAN CHEMICAL PAINT CO.

AMBLER ACP PENNA.

Office and Warehouse
3665 Palmer Ave., Detroit, Mich.

Canadian Office and Factory
Walkerville, Ontario

DISTRIBUTORS

West Coast
Leon Finch, Ltd., 728 E. 59th St.
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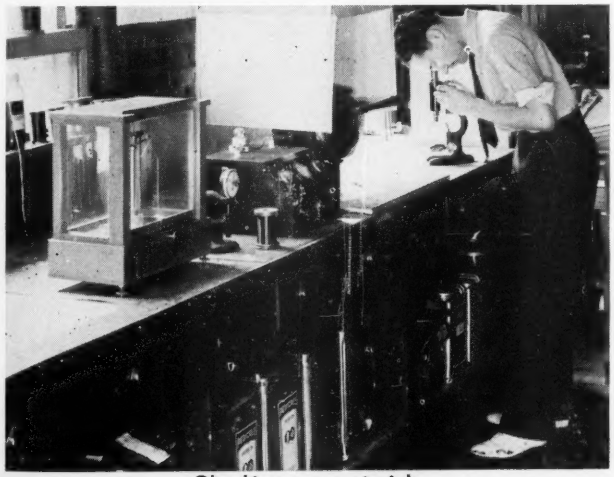
Metropolitan New York Area
Bricker & Andes, 318 Atlantic Ave.
Brooklyn, N. Y.

Eastern Ontario and Quebec
Van Camp Products & Sales Co.
177 Parliament St., Toronto, Ont.

Custom built spools for high speed winding

Mercury testing for continuity of film



Checking raw materials

Don't "fool around"... USE DEPENDABLE WIRE PRODUCTS!

A product, too, is only as strong as its weakest part. Follow the practice of leading designers and engineers by specifying only service-giving wire . . . wire that has built up a reputation for "delivering the goods under fire."

Hudson Wire products, designed for discriminating manufacturers, has just such a reputation in the fine wire field. Offering greater flexibility and tensile strength, perfect laying at higher speeds, new coating methods and reduced coil dimensions without sacrificing electrical values, Hudson Wire products will probably lower your production costs considerably. Check these three points:

QUALITY – All phases of manufacture, from ingot to final processing, are carefully supervised and fulfilled in the same manner you would carry out in your own plant. There are no unimportant phases in the work.

UNIFORMITY – By mercury process tests, our engineers can guarantee perfect uniformity in wire; from the smallest to the largest order. No more variations in consistency, structure or electrical properties . . . every inch of wire exactly as specified, more than meeting your requirements.

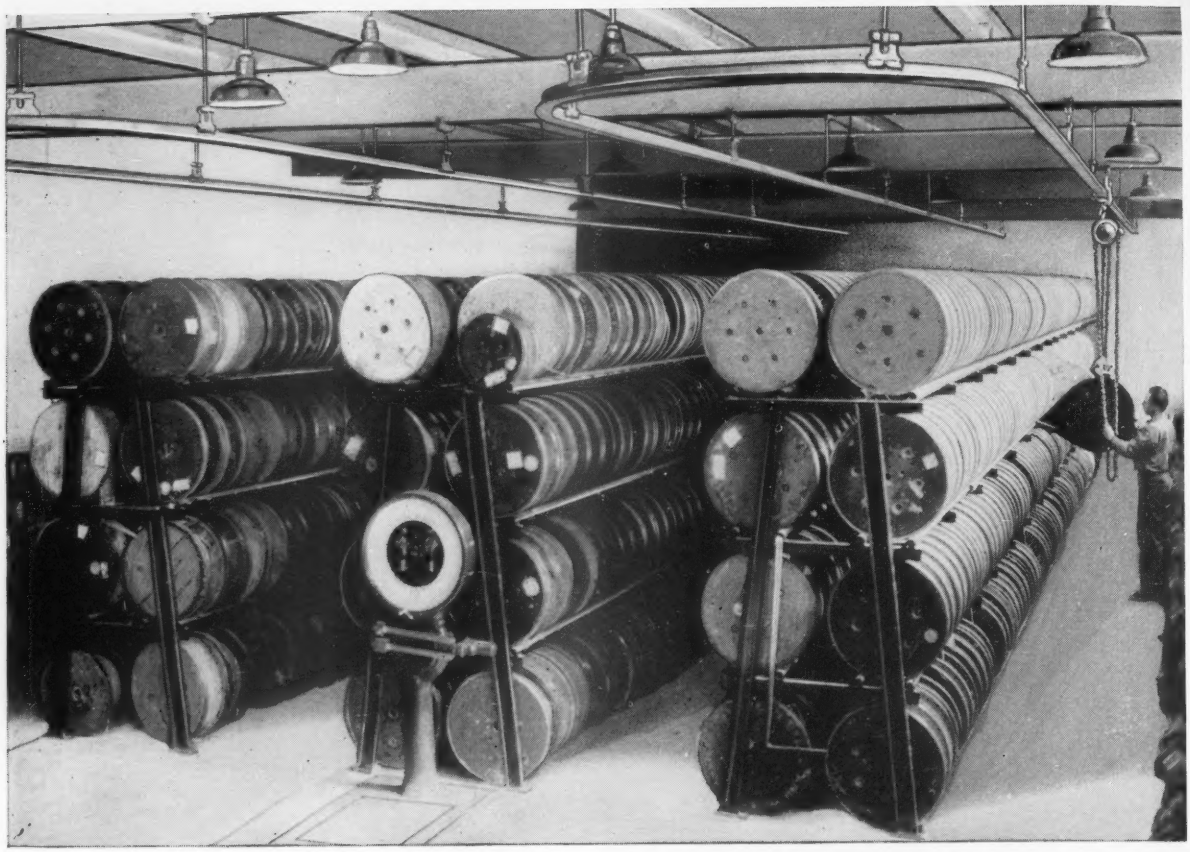
SERVICE – If you have a wire problem, our complete design and engineering facilities are at your disposal without obligation. Send your specifications and blueprints for our recommendations; or if you are not quite ready, write for samples of these quality products.

Enameled Copper, Enameled Iron, Enameled Alloy, Enameled Aluminum, Silk Covered, Cotton Covered, Celanese Covered, Glass Fibre Covered, Twisted Multiples, Parallel Multiples, and Litzendraht.

HUDSON WIRE CO.

Winsted Division

WINSTED CONNECTICUT



STORING AND HANDLING 1728 REELS

The three racks shown above are 63 feet long and will accommodate 576 reels per row or a total of 1728 reels. This number of 24″ reels will store 300,000 pounds of wire.

The reels are taken to or removed from the racks by means of a Cleveland Tramrail overhead rail system with easily operated chain hoists and special reel grabs. Each reel space is numbered and each reel is weighed before placing on racks, which makes keeping a perpetual inventory easy.

This is only one of the thousands of varied ways that Cleveland Tramrail helps systematize the handling and storing of materials and thereby aids production and reduces costs.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Apex Alkali Products Co.

research introduced and perfected the first lime-eliminating wire coating compound, Pic-Kleen — now universally accepted and widely preferred by the wire industry.

For the past six months a new and totally different wire coating compound by Apex has been tested and proven in the field. Actual production records in representative leading wire mills prove beyond all doubt that the new product —

Apex

is far superior in all respect to any wire coating compound available to industry, including Apex Pic-Kleen, its highly regarded predecessor.

PROVEN FACTS ABOUT KLEEN-KOTE

1. Kleen-Kote is guaranteed to eliminate completely the use of lime and its many inherent disadvantages.
2. Kleen-Kote cleans and coats the wire in a single dip, and after drying is ready to be drawn or stored.
3. Kleen-Kote is a rust inhibitor.
4. Kleen-Kote costs approximately ½¢ per ton of finished wire or rod.

This most recent innovation by Apex Alkali Products Co. research is distinctively identified by its bright green color.

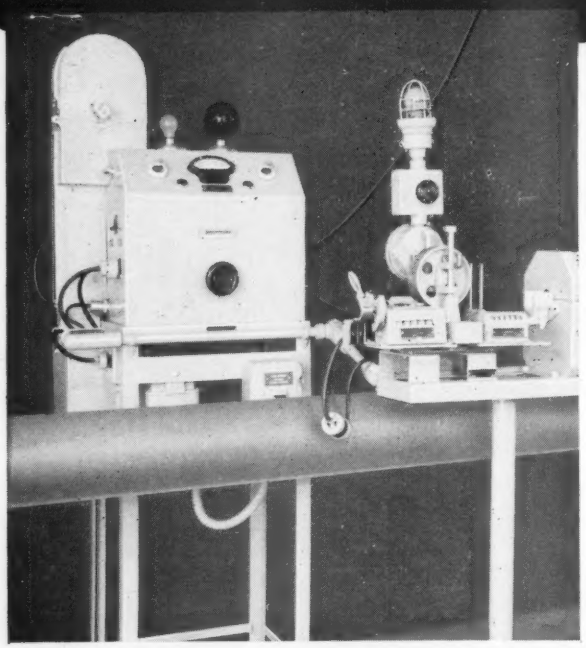
A trial run to prove the superiority of Kleen-Kote will be arranged to suit your convenience. Production data is available upon request.

Apex Alkali Products Co.

MAIN & RECTOR STS., PHILADELPHIA 27, PA. · PHONE: Manayunk 0960—North 0074

JLE

SPARK-TESTING, MEASURING AND RECORDING EQUIPMENT FOR USE ON CONTINUOUS VULCANIZING AND PLASTIC EXTRUDING MACHINES



EXCLUSIVE FEATURE

GUARANTEED TO MEET ALL NAVY, SIGNAL CORPS, UNDERWRITERS', CANADIAN, BRITISH AND RUSSIAN SPECIFICATIONS FOR SPARK-TESTING.

OTHER EXCLUSIVE FEATURES:

1 Records number of insulation faults in each reel as a permanent record on a paper tape.

2 Gives positive lamp signal to indicate whether each reel, as it is finished, contains any faults, or has been subjected to an interruption of power on the sparker.

3 Indicates total faults, reels and footage produced each day or shift.

4 Gives lamp and buzzer signal, as end of a predetermined length is reached on each reel.

5 Can be adapted to initiate an automatic change-over from one take-up reel to the other at a definite length.

6 Maintains maximum sparker-fault-circuit sensitivity without adjustment of any kind for varying wire and atmospheric conditions.

Send for specification sheet.

JAMES L. ENTWISTLE CO.

43 CHURCH ST., PAWTUCKET, R. I.

WORLD'S LEADING MANUFACTURER OF SPARK-TESTING EQUIPMENT

An improved product *demands* an improved wire!

from .001 to .050 *SPECIFY SPENCER*
Beryllium, Phosphor Bronze and Stainless Steel wire for . . .
1. EXACT SIZES 2. SPECIAL USES 3. EXACT PHYSICAL CHARACTERISTICS

Manufacturers of today's and tomorrow's products can now demand — and get — controlled specification fine wire in Beryllium, Phosphor Bronze and Stainless Steel. Spencer — originators of "Control Crimp" and "Spencerized" wire — invite your wire product problems.

"SPECIFY SPENCER"
for *exact* specifications

Precision
SPENCER WIRE

SPENCER WIRE COMPANY
WEST BROOKFIELD PLANT
WEST BROOKFIELD • MASS.

IS IT GOOD THROUGH THE *LAST* PASS?

Does the lubricant you use on your multi-pass draws carry through to the last one at the speeds your production demands? If you are having any trouble, you will find it worth your while to investigate the possibilities of the Magnus line of lubricants.

For example, Magnus 52C-1, developed particularly for high carbon wire, offers considerable improvements in drawing speeds on multi-pass operations on stainless and other alloy wires as well. It is used either straight in the die box, or mixed with lime up to 50%, depending on the nature of the draw. 52C-1 also tends to produce a brighter finish, with a marked improvement in die life. Scratches on finished wire are virtually eliminated.

Get in touch with Headquarters . . .

We would like you to feel that whenever you run into any difficulties in which wire drawing lubricants are involved, you are free to call on Magnus for ideas and for help in working out a lubricant to meet your particular needs.

MAGNUS WIRE DRAWING LUBRICANTS

as typified by 52C-1 are the result of the Magnus policy of developing "tailor-made" lubricants to solve difficult individual drawing problems. Most of the items in the Magnus line were originally worked out to meet tough production problems, and later found wider fields of application in wire drawing as their qualities were proved in service. We are ready at any time to work with you on any particularly difficult wire drawing operation.

MAGNUS

MAGNUS CHEMICAL CO., 188 SOUTH AVE., GARWOOD, N. J.

Wire Drawing Compounds

Sure...there's a FIBERGLAS*-insulated wire to use there
There is a FIBERGLAS Insulation Material for every need
Fiberglas insulated magnet wire is made in several types: SC, DC, SGE, DGE, SGE, DGF, SGHF, DGHF, etc.
Fiberglas braid covered lead wire is available in many sizes.
Aircraft and automotive ignition cable, with Fiberglas advantages, is available in several sizes.
Fiberglas insulated low tension hook up wire for many radio and electronic applications.
Other Types of Fiberglas-Insulated Wire and Cable
Varnish Impregnation
Complete Information
Each distributor of Fiberglas-base Insulation Materials has his own source of supply, since Owens-Corning Fiberglas Corp. does not process these materials.
FIBERGLAS
*T. M. Reg. U. S. Pat. Off.
ELECTRICAL INSULATION MATERIALS
Trade Paper Ad No. 5-7114
for Electrical World, July 21 and Electrical Engineering, July, 1945
Write for Catalog EI-44-7.

Helping you develop profitable sales

The advertisement shown above is appearing in leading electrical trade publications. It is telling thousands of readers about Fiberglas*-insulated wire.

It is pulling inquiries for the Fiberglas Electrical Insulation Materials Catalog—the catalog which is winning friends and influencing the buying of Fiberglas-insulated wire.

These and other promotional activities, supporting the advertising and sales activities of the many wire companies, are selling the advantages which the user obtains from Fiberglas Insulation—helping develop profitable sales.

Why not cash in on the expanding market for Fiberglas-insulated wire and cable? Reprints of Fiberglas advertising and copies of the new catalog are available for use by wire and cable companies. Write *Owens-Corning Fiberglas Corporation, 1875 Nicholas Building, Toledo 1, Ohio.*

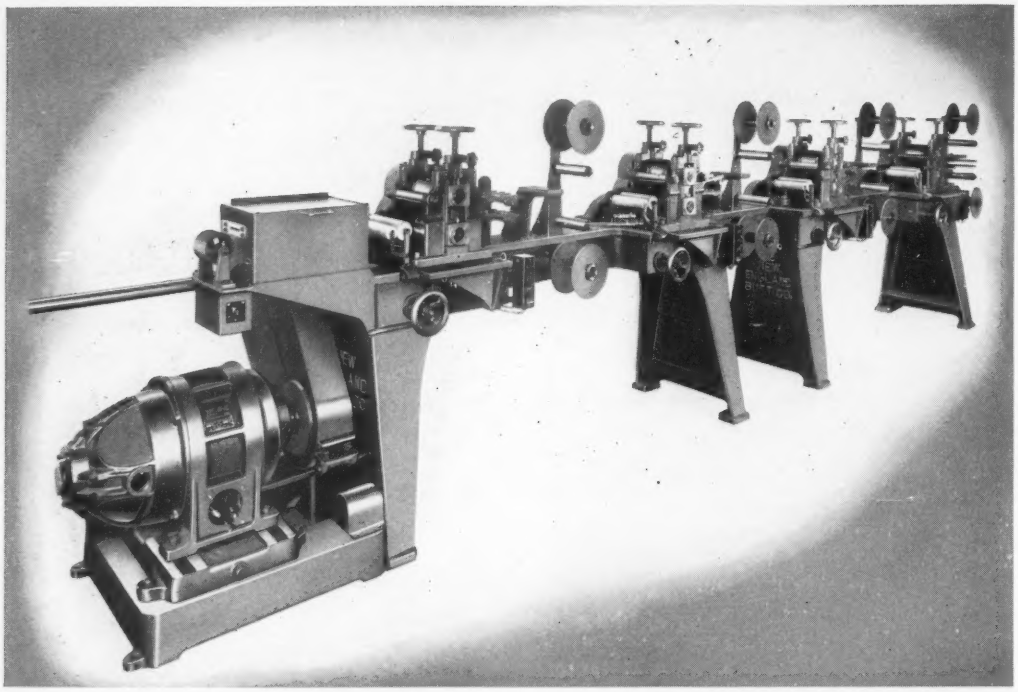
In Canada, Fiberglas Canada Ltd., Oshawa, Ontario.

ARMY E NAVY

FIBERGLAS *ELECTRICAL INSULATION MATERIALS*

*T. M. Reg. U. S. Pat. Off.

RUBBER STRIP COVERING MACHINES



RUBBER STRIP COVERING machines are designed to meet all requirements in the manufacture of high quality rubber jacketed wires and cables.

Rubber is applied to the cable in successive layers until the correct thickness of jacket is obtained.

As many as twelve wires of the smaller sizes may be covered simultaneously on each machine.

The covering machines are built in two sizes:

R-11 with 9" diameter cutter rolls
R-4 with 6" diameter cutter rolls

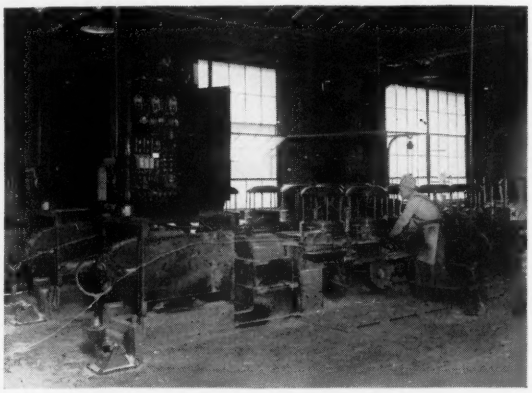
These machines are built with either single or multiple number of heads, and in combination with taping units, to suit customer requirements.

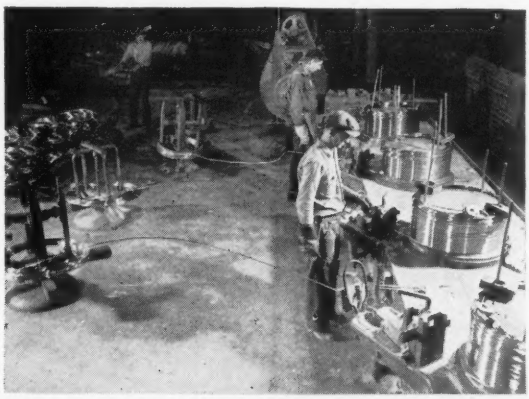
WRITE FOR DETAILS

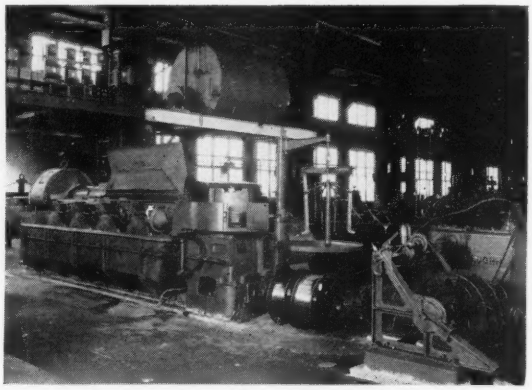
NEW ENGLAND BUTT COMPANY

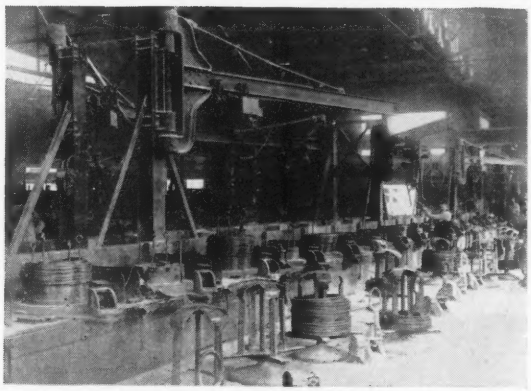
304 PEARL STREET

PROVIDENCE 7, RHODE ISLAND, U. S. A.









Complete Wire Lubrication for any Mill

WITH the formulas listed below any finish may be produced with highest production per die, and high speed without interruption or tieup in your schedule.

No. 33 for extra bright finish on 1 and 2 hole wire.

No. 108 for extra bright finish on three holes or more at high speed.

No. 91 for regular wire finish or nails, or rod breakdown on either high or low carbon.

No. 50 for hard finish on spring wire.

No. 55 or No. 3 for intermediate processing on patented or annealed stocks.

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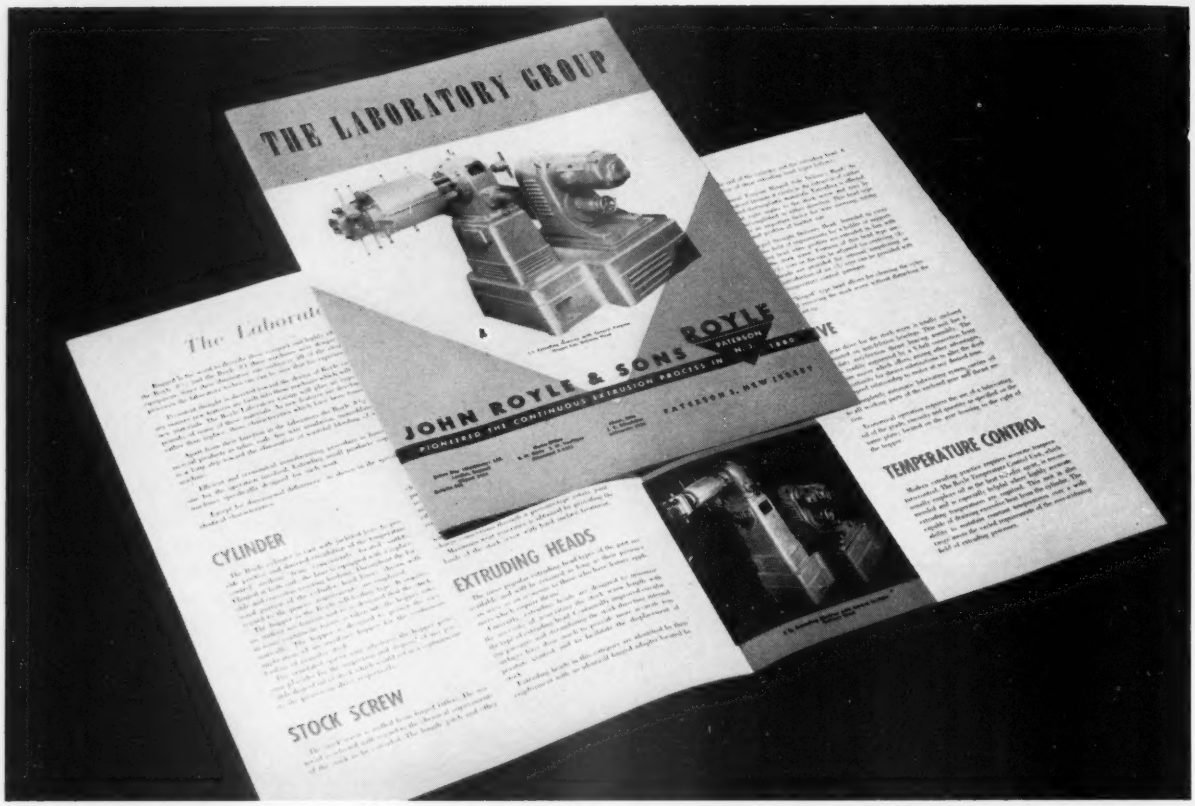

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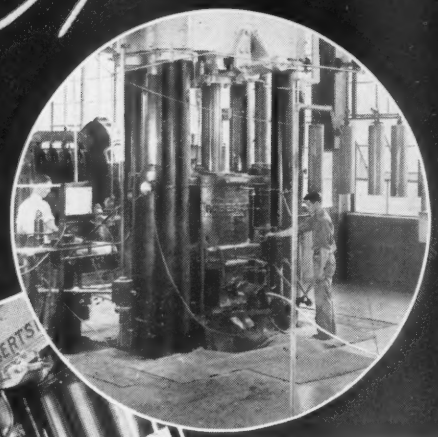

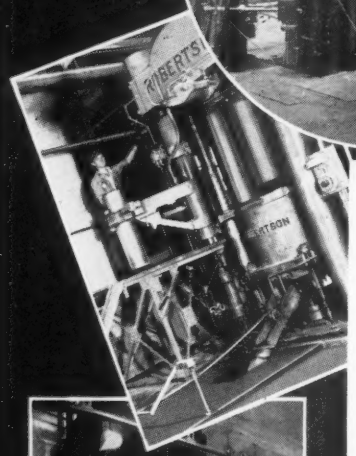

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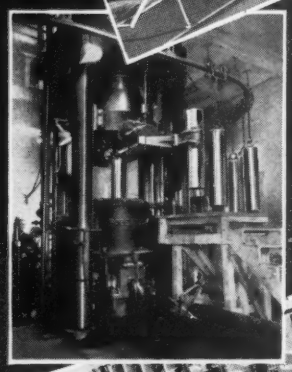

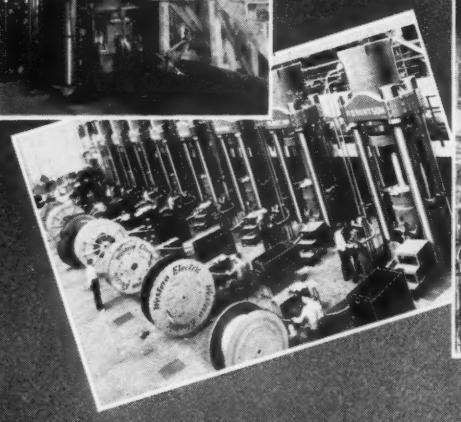

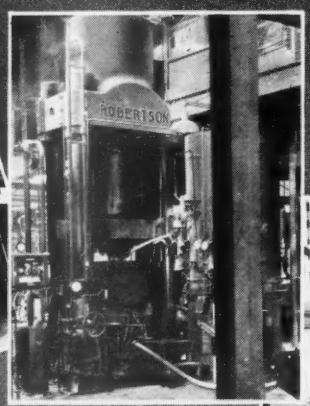

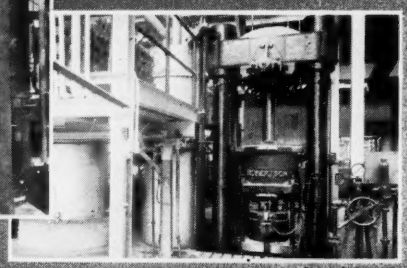

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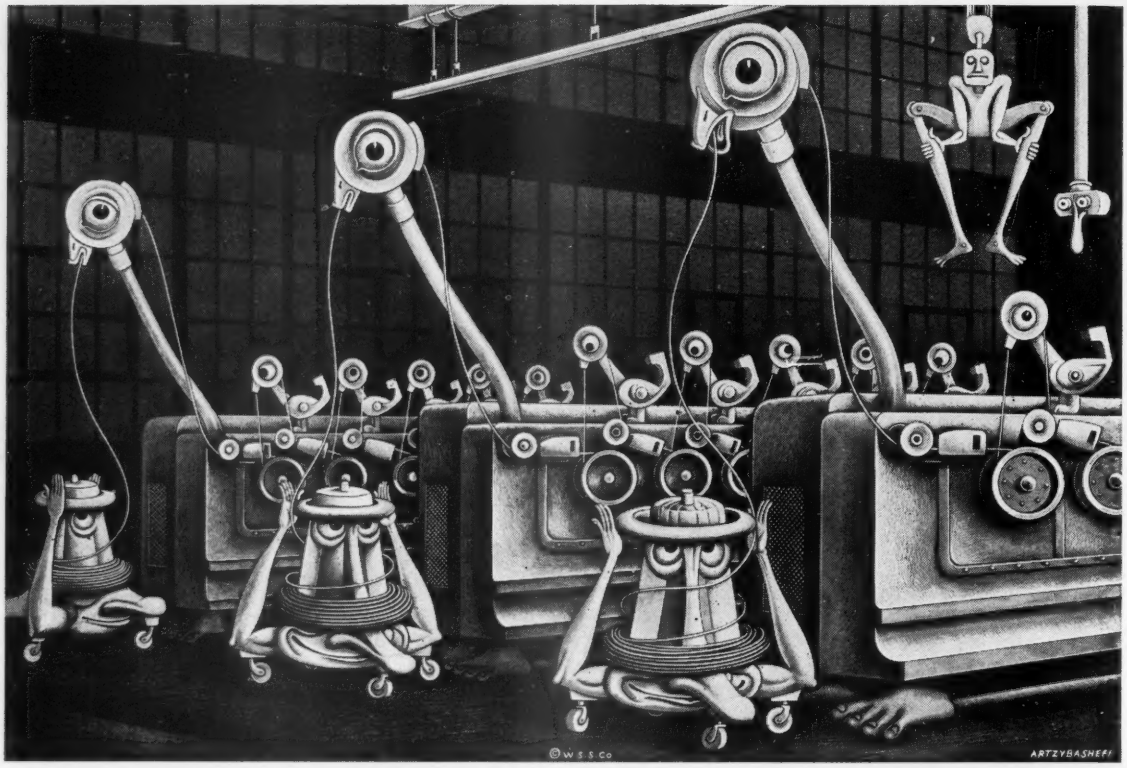

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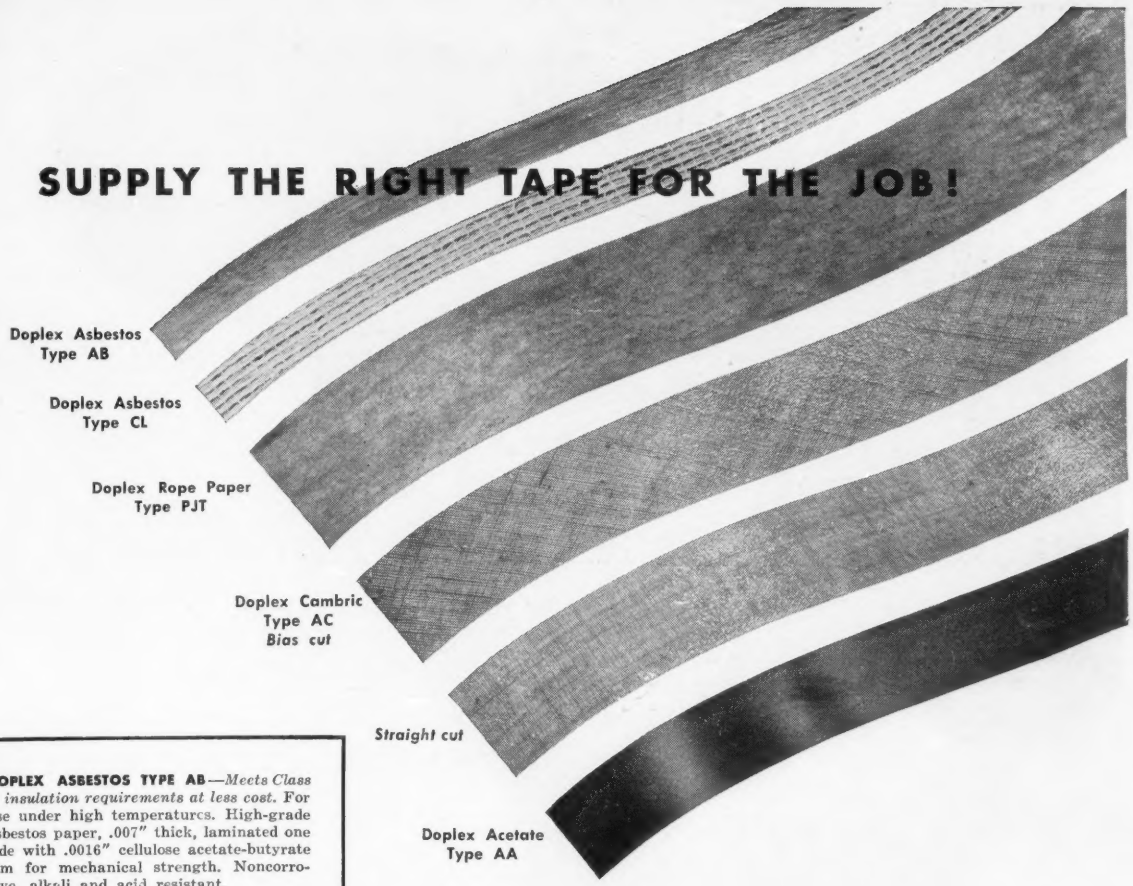

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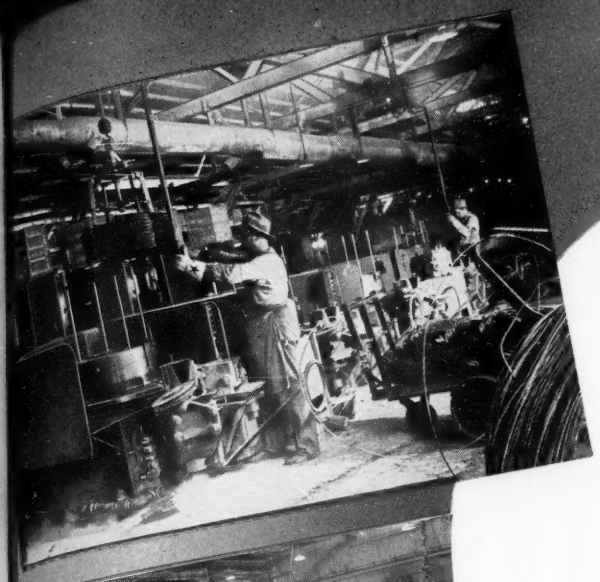

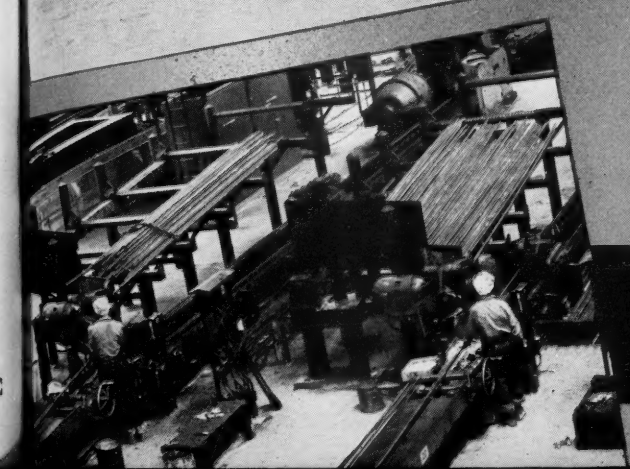

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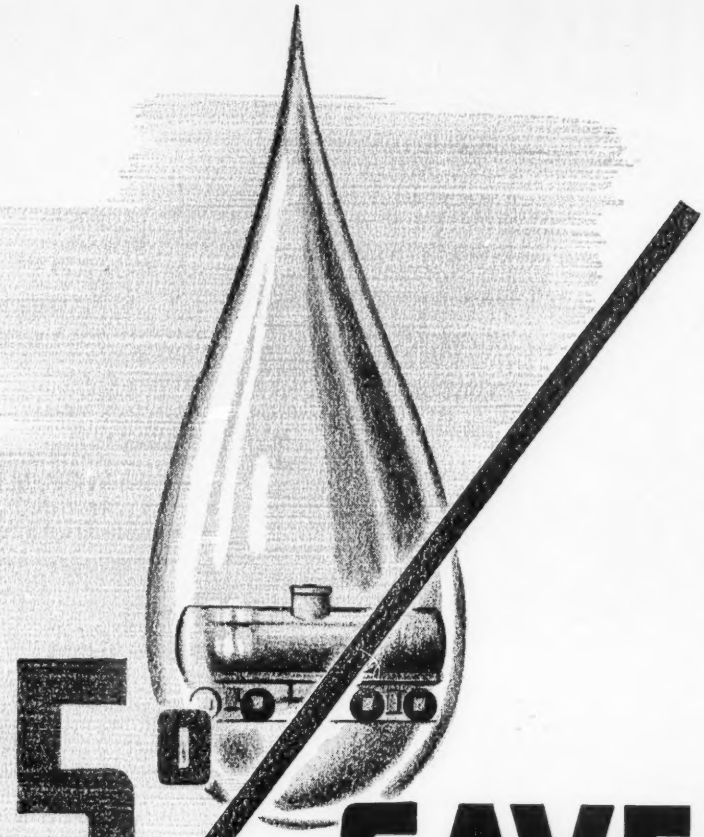

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 20 AUGUST, 1945 No. 8

Designated as

Official Publication By The Wire Association

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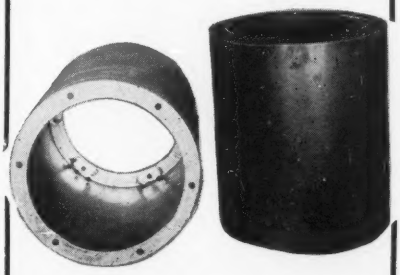

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 20 AUGUST, 1945 No. 8

Wire Gold Braid and Military Insignia

By Dr. R. Levi,

Chief Chemist, Wire Division, North American Philips Company, Inc.,

Dobbs Ferry, New York.

The author describes the development of a new industry and the different manufacturing processes.

TRADITIONALLY, almost every navy in the world and many foreign armies are using gold-clad wires for insignia and indication of rank on the uniforms of their officers. While it might seem extravagent to use such costly material, especially in time of war, there are very good reasons why gold should be chosen.

✦ ✦ ✦

FIRST of all, only small quantities of the precious material are required to give the desired effect. Second, gold gives the best contrast with the uniform, which is usually a dark color. Third, extremely thin gold layers are sufficient to give less expensive cores suitable protection from atmospheric agents. Of course, the heavier the gold layer the better are the wearing qualities. The U. S. Navy specifies 2% gold, whereas some other countries utilize a coating of 4% or higher. Fourth, gold has not been subject to high priorities. This would indicate that use of gold for insignia does not impede the production of highly essential industrial products.

PRIOR to World War II, almost all wire products used in manufacturing gold braid and military insignia were imported from France and a small amount from England. With European trade coming to a sudden end, this country was faced with an acute shortage of these materials and efforts were made immediately to start producing them over here.

✦ ✦ ✦

MANY difficulties had to be overcome because most of the processes were held as trade secrets by European manufacturers, but today unlimited quantities are again available and the quality is entirely satisfactory. Some of the methods used and a few of the problems involved in producing these materials will be discussed here.

First of all, these wires should be divided into two separate groups which are:—

1. Wires with a silver finish.
2. Wires with a gold finish.

Both of these classifications are then to be divided into different categories according to the atmospheric conditions they will be required to withstand, price and wearing qualities.

✦ ✦ ✦

Wires with a Silver Finish

1. Solid silver wire — for this, a high purity silver is used, such as 995/1000 or better since a lower grade would have a grayish color and would harden excessively by cold drawing thus requiring intermediate annealing operations.

2. "Copper silver" that is copper wire usually clad with a 2% by weight layer of silver and then drawn to the required size. The manufacturing methods are the same as for the gold-clad wires which are discussed later.

✦ ✦ ✦

Wires with a Gold Finish

THIS group is by far the most important because it involves the largest quantities and the greatest manufacturing difficulties. There are

two distinct categories:—

1. **Mifin Wire.**
2. **Silver, clad with a specified amount of gold.**

1. Mifin wire—this is the less expensive grade of wires with a gold finish. It usually consists of a copper base covered with a 2% by weight layer of silver over which an exceedingly small amount of gold is electrodeposited at the finished size. For this material, the gold shade and not the percentage of precious metal is usually specified by the customer. Therefore, the skill on the manufacturer's point of view consists in obtaining the required shade while holding the gold down to the smallest possible amount. Of course, the chief problem involves maintaining a particular shade with no variations.

✦ ✦ ✦

BASICALLY, a machine for electroplating wire in a continuous process is quite simple. From the take-off spool, the wire runs at a given speed through a series of tanks where it is cleaned, rinsed, electroplated, again rinsed, and finally wound on the take-up spool. While this may sound very simple, unfortunately, for the manufacturer, this is not the base because of two considerations:—

(a) Many factors are involved in electroplating, each one having a definite effect on the structure of the deposit. By structure, we mean surface irregularities, grain size, shape of grain and orientation of the crystallographic character of the metal deposited. The structure in turn, influences absorption and reflection of the different wave lengths composing white light. Therefore, structure has a direct effect on the color of the gold.

(b) Yellow is a color to which the human eye is extremely sensitive.

✦ ✦ ✦

HERE are the factors involved in pure gold plating from a cyanide solution. In alloy gold plating, conditions are much more complicated.

Thickness of the gold layer
Color of the basis metal
Plating time
Current density
Agitation
Temperature
Gold content
Free cyanide
Carbonates
Addition agents
pH
Contaminations

To obtain consistent results, rigorous scientific control of all of these factors is an absolute requisite.

✦ ✦ ✦

IN order to give the reader at least some idea of the manufacturing difficulties as far as the plating is concerned, we shall amplify the first two items which are closely related to each other and play a leading role in the case of flash deposits. For a more complete analysis, reference should be made to J. B. Kushner's article in the December 1940 issue of "Products Finishing."

✦ ✦ ✦

A STANDARD wire size is .004" in diameter and a usually satisfactory color can be obtained with as little as a 3% by weight layer of gold. This means that the gold thickness is .0000014" or about 1/1500, the size of an average hair. Such a thin layer is actually translucent and, therefore, the color of the basis metal has a marked effect on the appearance of the plated wire. This is one reason why the copper wire is clad with silver prior to gold plating: If the gold is plated directly on the copper, the resulting shade is an undesirable dark red.

✦ ✦ ✦

FURTHERMORE, because of the yardage of this kind of wire, (there are about 20,000 feet, size .004" in a pound) it is essential for economical reasons to use high plating speeds. These are usually obtainable through high current densities. The speed of the wire once established must remain constant but most of the previously enumerated plating factors become all the more critical the higher the current density and may effect not only the structure of the deposit, but also the rate of deposition of the gold. Since the speed of the wire is constant, variations in the rate of deposition will effect the thickness of the gold layer. This plays in itself an important part in determining the shade of the wire.

ANOTHER type of wire which should be mentioned is "metal thread." This consists of silver or "copper silver" wire wound closely around a yellow silk or cotton thread. The thread is then gold plated. The problems involved in this operation are the same as for the "mifin" wire. The metal thread can be manufactured also from a wire already clad with gold and this actually is done when a high grade product is required. For the less expensive materials, it is preferable to gold plate the metal thread as this method allows a 50% saving in precious metal by confining the deposition of gold to the outer surface of the metal ribbon. Since the inner surface is in contact with the core, any gold deposited on it would add nothing to the appearance of the product.

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2. **Silver wire** clad with a specified amount of gold — specifications for this kind of wire usually call for two, four and sometimes up to ten per cent. gold by weight. The amount depends upon the required degree of resistance to corrosion and wear. While the percentage of precious metal must be held within rigorous limits because of strict specifications and economic considerations, the shade of the gold and its brilliance are also highly important.

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THERE are several methods for applying the gold on the silver base and we shall divide them into mechanical cladding processes and electrodeposition processes. In some instances, a combination of the two is used.

✦ ✦ ✦

Mechanical Cladding

THE oldest method of this kind consisted in the application of thin gold foils on silver rods (1-1.5" diameter) at red heat so as to create a solid bond between the two metals. The coated rods were then drawn down to the desired size. This method was highly dependent on the human factor. Furthermore, there were limitations in the medium thickness of the gold foils and consequently, it was not practical for producing wire with low gold percentages.

IN recent years, another method of cladding has been introduced. The new process is based on the production of a bimetal sheet from which a shell is drawn keeping the gold layer on the outside. A silver core is then inserted into the shell and bonded to it by the application of heat and pressure. This process has two definite advantages: Not only does it eliminate the human factor but it allows production of wire with much lower gold percentages.

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THE cladding operations which are conducted at relatively high temperature do not produce any color shading of the gold. The diffusion coefficients of gold in silver or vice versa are relatively small. Silver and gold form a continuous series of solid solutions, a circumstance which generally corresponds to low diffusion rates. Therefore, it is fairly easy to confine the thickness of the diffused layer to an extremely small percentage of that of the total coating.

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THIS point is of the greatest importance. As the gold-clad rod is drawn down to fine wire, the thickness of the gold layer is reduced proportionately. At the finished size, it is usually so thin, that its appearance is influenced by the core material. For this reason, it is essential to limit to a minimum the amount of gold which diffuses into the silver core, because the gold absorbed will further reduce the thickness of the pure gold layer.

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Electrodeposition

ELECTROPLATING of the gold on the silver wire after this has been drawn to the finished size does not give satisfactory results because of difficulties in maintaining the shade, lower brilliance and less resistance to corrosion than when a mechanical cladding process is used.

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HOWEVER, these disadvantages can be overcome by plating at a heavy size and by subsequently cold drawing to the final size. Although, the drawing operation necessitates certain precautions which are common to the drawing of all clad materials, the wire obtained by this method is practically identical in brilliancy and resistance to corrosion to the product obtained by mechanical cladding.

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THE effects of the cold drawing operation on the electrodeposited coating are the following:

1. The gold layer is strain hardened, thus improving its wearing resistance.
2. Due to the very high pressures involved, irregularities in the surface contour are smoothed out and the surface layer is made very dense.
3. Because of the severe cold working, the gold reaches the limiting grain size which is independent of the original electrodeposit.

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AS a consequence, not only the brilliance and corrosion resistance of the wire are greatly improved, but shade variations which might have occurred because of changes of some of the plating conditions are completely eliminated.

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UNALLOYED silver, or preferably, high purity silver is generally specified for the core material, whether the gold is electroplated or applied mechanically. The reason for this is that some of the wire is used for weaving with cotton and silk thread, other is tightly coiled on automatic machines and later used for embroidery. (See photographs). In both cases, softness, resilience and like characteristics must be controlled closely.

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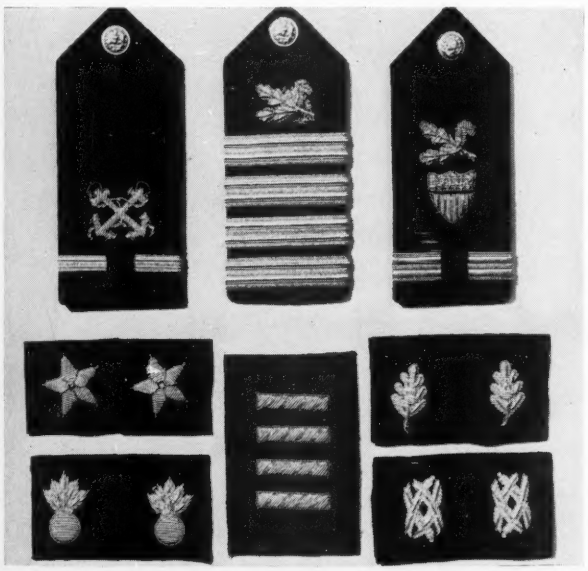
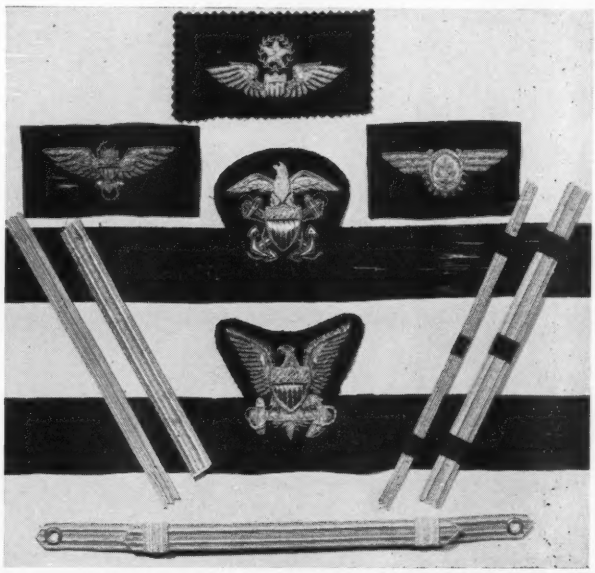
NOT only is the high purity silver used because of its softness, but also because it may be drawn with little or no intermediate anneals. Annealing, as may be readily surmised is disastrous to a thin gold plate. Only a small amount of interdiffusion is necessary to cut heavily into the thin gold layer. To apply gold adequately thick so that the diffusion in annealing would not cut into the gold sufficiently to affect its appear-





ance, would cost considerably more than the saving effected by the use of low purity silver.

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Drawing of Clad Wire

MOST wire used in the manufacturing of gold braid and military insignias ranges in size between .004″ and .0018″. Thus it can be considered as fine for all practical purposes. The problems involved in the drawing of fine wire (Some Problems Influencing the Drawing of Fine Wire, by H. P. Edinga, found in the 1944 October issue of Wire & Wire Products) are greatly increased in the case of clad wire. Two of the most important factors will be discussed here:—

1. **Dies**—while in the case of bare wire the finish is determined mainly by the so-called finishing die, for clad wires every single die used in the entire drawing operation assumes the highest importance. In extreme cases, a bad die (bad means out of round, insufficiently polished, or not of the right draft) may partly strip the coating; and it takes much less than that to spoil the product. Since the gold layers being handled are extremely thin (for 2% gold on silver of .002″ size, the thickness of the gold layer is only .0000055″) a small loss in gold may cause undesirable highlights.
2. **Drawing drums**—they must be free from grooves and highly polished. Furthermore, excessive slippage must be strictly avoided in order to prevent (1) loss of gold by friction and (2) excessive heating of the wire which may result in accelerating the diffusion between the gold and silver. To decrease these dangers, wet drawing is usually preferred to dry drawing.

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HOWEVER, if the drawing operation is performed with sufficient care, not only the quality of the coating is improved but practically none of the coating metal is lost. Because of wartime restrictions on the use of metals, these wires are now manufactured only to be used for the armed forces.

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NAVY specifications call for the highest grade materials (silver wire and silver clad with a minimum of 2% gold by weight) because of the severe conditions they will be required to stand, such as salt spray. For Army purposes, instead, the inexpensive grade such as copper silver and mifin wire is considered satisfactory. In the postwar years as critical materials are made available for civilian use, we can anticipate a very large demand for the cheaper products for decorative purposes (costume jewelry, garment industry, gift wrappings, etc.). But this is a matter of fashion which is unpredictable.

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IN addition to the fact that a new industry has been developed in this country, experience gained has helped solve many other important problems related to the war effort.

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A NOTABLE example of this involves a continuous process for plating molybdenum and tungsten wire (in some cases, as small as .0006″ diameter) to overcome secondary emission in electronic tubes.

✦ ✦ ✦

Cooperation of the General Plate Division of Metals & Controls Corporation, Attleboro, Massachusetts, in supplying certain information is gratefully acknowledged.

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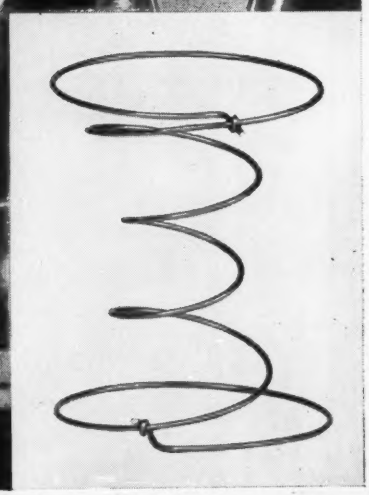

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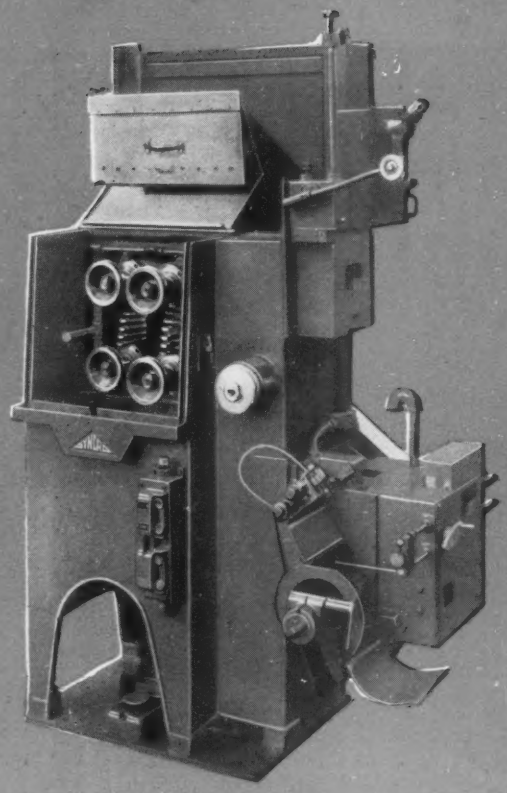
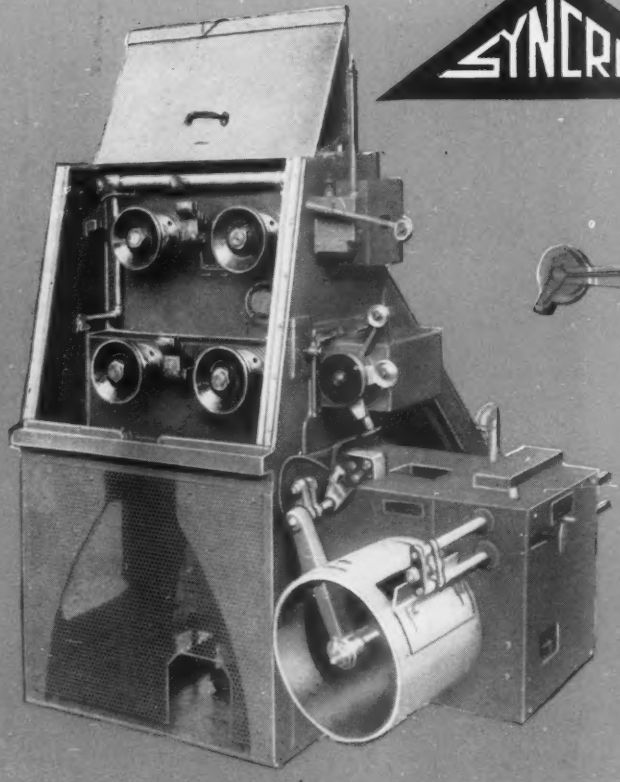


TYPE AA-14
Enter #26 B & S Ga.
Finish #40 to #46 B & S Ga.

TYPE A-16
Enter #16 B & S Ga.
Finish #30 to #38 B & S Ga.

SYNCRO



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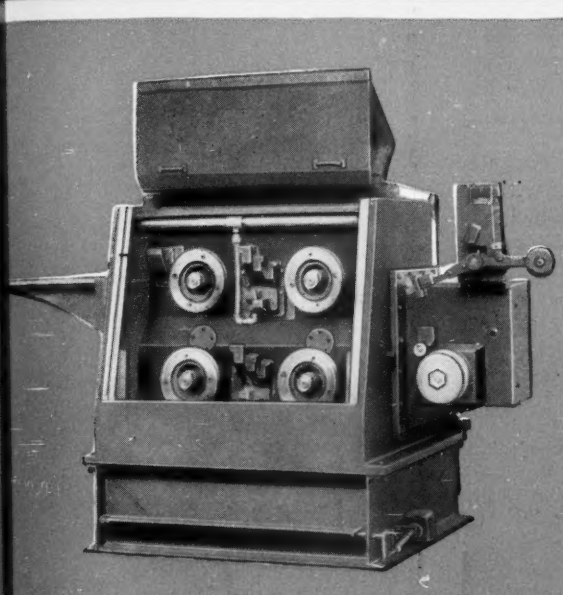
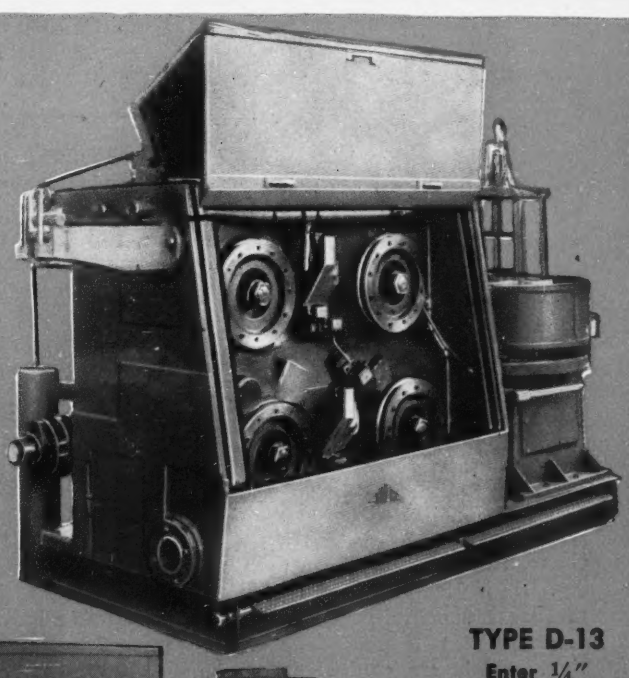
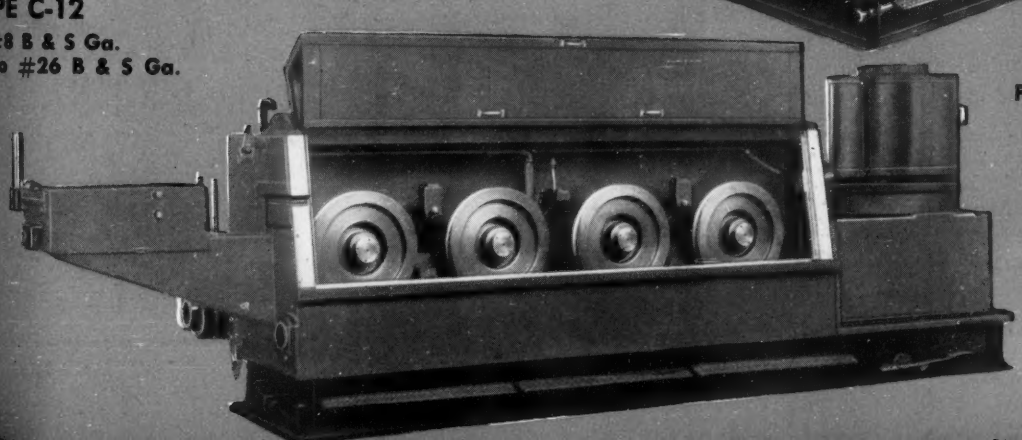


TYPE C-12
#8 B & S Ga.
18 to #26 B & S Ga.



TYPE D-13
Enter 1/4"
Finish #12 to #18 B & S G



TYPE H.F.
Enter 1/2"

Specification Requirements for Spark Testing of Insulated Wires

This is an abstract from a report made by Shaw-Rutan, Inc., of New York, N. Y., as a study of the electrical characteristics and speed of operation of the relay of a sparker and is published in the belief that it will supply a fresh slant on sparker use and operation of practical value to those using these devices. Mr. Rutan is a member of the American Society of Electrical Engineers, where he has been a member of the Instruments and Measurements Committee for fifteen years and of the American Society for Testing Materials, where for ten years he has served on the Electrical Insulation Committee. The sparker studied was a standard type, made by the R. L. Davis Manufacturing Co.

EVER since the beginning of the insulated wire industry, the matter of locating dielectric faults in the insulation has been a problem. Where the wire has a final test in water and is subjected to high voltage and then tested for insulation resistance with a sensitive galvanometer, the specification requirements for spark testing have not been too important. As the trend today is to eliminate the water test, the necessity for some sort of specification for performance for automatic spark testing is becoming more important. The Underwriters' Laboratories and the Army and Navy have been working on this problem.

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ONE of the difficult requirements to specify is the so-called sensitivity test. Where a requirement for spark testing only takes care of dielectric failures, the matter of sensitivity is not important. The factor of prime importance is the speed of the response of the fault relay. It is very essential that the relay which controls the counting and stopping mechanism of the sparker operate fast enough so that there is no doubt that defect in the wire, which occurs just when the wire is leaving the electrode, will operate the fault relay. It is therefore necessary in making a sensitivity test or speed response test to reproduce conditions which are equivalent to the speed of the wire that is leaving the electrode.

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WITH this thought in mind, **Mr. Everett J. Rutan** of Shaw-Rutan, Inc., Consultants to Industry, New York City, was employed to make a comprehensive study of this problem, and in order that the tests be entirely impartial and without question as to results obtained, the work was done at the **Electrical Testing Laboratories** in New York City, where all the instruments are checked and calibrated against known standards. The results of this investigation are as follows:

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Electrical Characteristics of the Electrode

THE purpose of the electrode is to maintain a high tension testing voltage on the exterior surface of the insulation of the wire under test. Contact and conduction are accomplished in three ways, namely:

1. **Direct contact with the trough and the bead chains.**
2. **Ionization of the spaces between the trough and the bead chains and the insulation.**
3. **Arcing from the trough or bead chains to a fault not in direct contact.**

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IF an insulated wire with a grounded conductor is placed in the electrode and potential is applied, the equivalent circuit (if no faults exist in the insulation) is that of a capacitor, representing the capacitance between the conductor and the electrode, in parallel with a high resistance, representing insulation resistance and leakage to ground. When a fault occurs, a low resistance, corresponding to the resistance of the arc path through the fault, is placed in parallel with the other circuit elements. This resistance is so low that the effects of the capacitance and the high resistance become negligible.

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WHEN no faults are encountered in the insulation, the load imposed by the electrode upon the testing transformer is predominantly capacitive, the resistive load due to insulation resistance and leakage being negligible. This is illustrated by the oscillogram in the upper panel of Figure 10, where the current will be observed to be leading the voltage by almost 90 degrees.

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THE same oscillogram also indicates that the voltage impressed upon the insulation is essentially sinusoidal in wave form.

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IONIZATION in the electrode is desirable since it provides, in effect, improved contact between the electrode and the surface of the insulation within the electrode. The presence of ionization was determined by analyzing the current passing through the electrode with a cathode ray oscillograph. The lower panel of Figure 10 is a photograph of the oscillograph screen. The high

frequency fringe at each peak of the current wave indicates ionization.

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A VARIETY of wires similar to those normally subjected to the sparker test in commercial practice was placed in the electrode one at a time, and the applied voltage was increased until ionization was observed. It was found that ionization began at about 3000 volts in all instances. This value was not affected by changes in wire diameter or in insulation thickness, for the types and sizes of wires that were tested.

Speed of Operation of Relay

THE speed of operation of the fault relay was determined by setting up apparatus to simulate the most adverse conditions under which the relay would be called upon to operate, and then making oscillographic records of the voltages and currents involved in the relay operation under these conditions.

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AT a wire speed of 1200 feet per minute, a point on a wire will be under test within a 3-foot electrode for 0.15 seconds, or 9 cycles. From the standpoint of relay operation, the most critical dielecetric breakdown would be one occurring at a point on the wire as it leaves the electrode. In such a case current would flow only so long as an arc is maintained between the fault and the end of the electrode. Failure to operate in this short period would allow faulty wire to pass undetected.

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TO simulate the above conditions, a rotary gap was constructed with electrodes having hemispherical ends about ¼ inch in diameter. The stationary electrode was mounted on an insulator and connected to the high voltage terminal of the sparker. The grounded electrode which was about 30 inches long was attached horizontally to the vertical shaft of a 75 r.p.m. synchronous motor. The moving electrode traveled in a circle 60 inches in diameter and moved past the stationary electrode at 1200 feet per minute (4 inches per cycle). The gap length was adjusted by shifting the stationary electrode so as to simulate various dielectric strengths of insulation. The gap was adjustable so that the electrodes could be set closest at the crest of the voltage wave.

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IT will be seen that the above described equipment, when operating, repeatedly simulates a dielectric breakdown occurring at the end of the electrode as the wire passes through at the rate of 1200 feet per minute. Current can flow through the relay only so long as an arc is maintained between the moving electrode (representing a faulted wire) and the stationary electrode (representing the end of the test electrode chamber).

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THE performance of the relay under the conditions described is illustrated on the oscillogram reproduced in Figure 11. The top wave was taken from point 12 on relay A to ground. With the relay in its normal, or closed position, 60 cycle line voltage was available at this point. An interruption in this voltage wave shows the time of opening of the relay contacts. The middle line represents the current through the gap during breakdown, and is the cur-

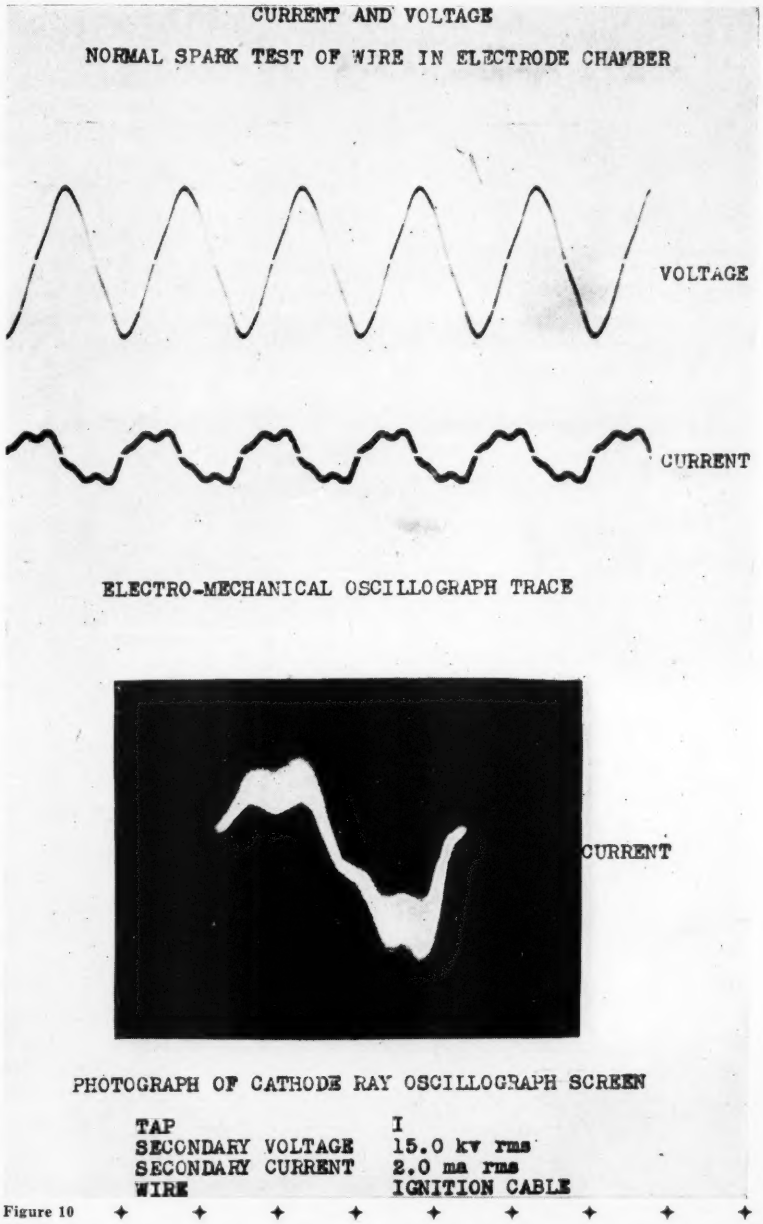

Figure 10

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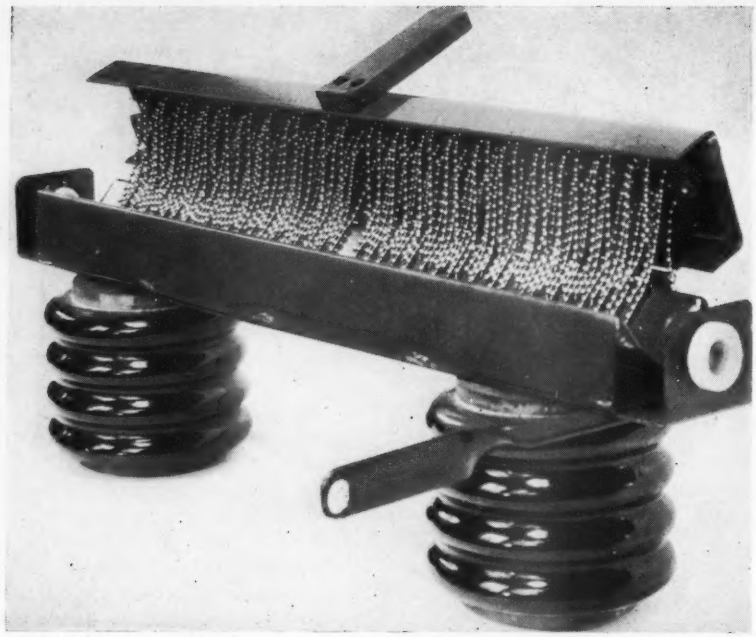

Electrode

rent which operates the relay. This current also indicates the duration of the arc. The lower wave represents the voltage across the gap, which drops at breakdown to practically zero.

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FROM this oscillogram, it is seen that the current flows through the relay for about ½ cycle, but that the relay opens within 1/3 cycle and remains open for 1½ cycles, allowing ample time for the operation of relay B.

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THIS test was repeated at various voltages, with identical results. Tests were made also with capacitors and resistors in parallel with the gap to simulate the capacitance and insulation resistance of wire in the test electrode. It was found that due to the low resistance of the arc at breakdown, the effects of the capacitors and resistors were negligible, and did not change the time of operation.

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NUMEROUS tests were conducted with the air gap adjusted to a critical point, i.e., so that the gap did not break down at every revolution for a given applied voltage. These tests were conducted on each of the nine taps, and it was observed that without exception the relay and counter operated whenever a breakdown occurred, if the transformer primary was operated at rated voltage.

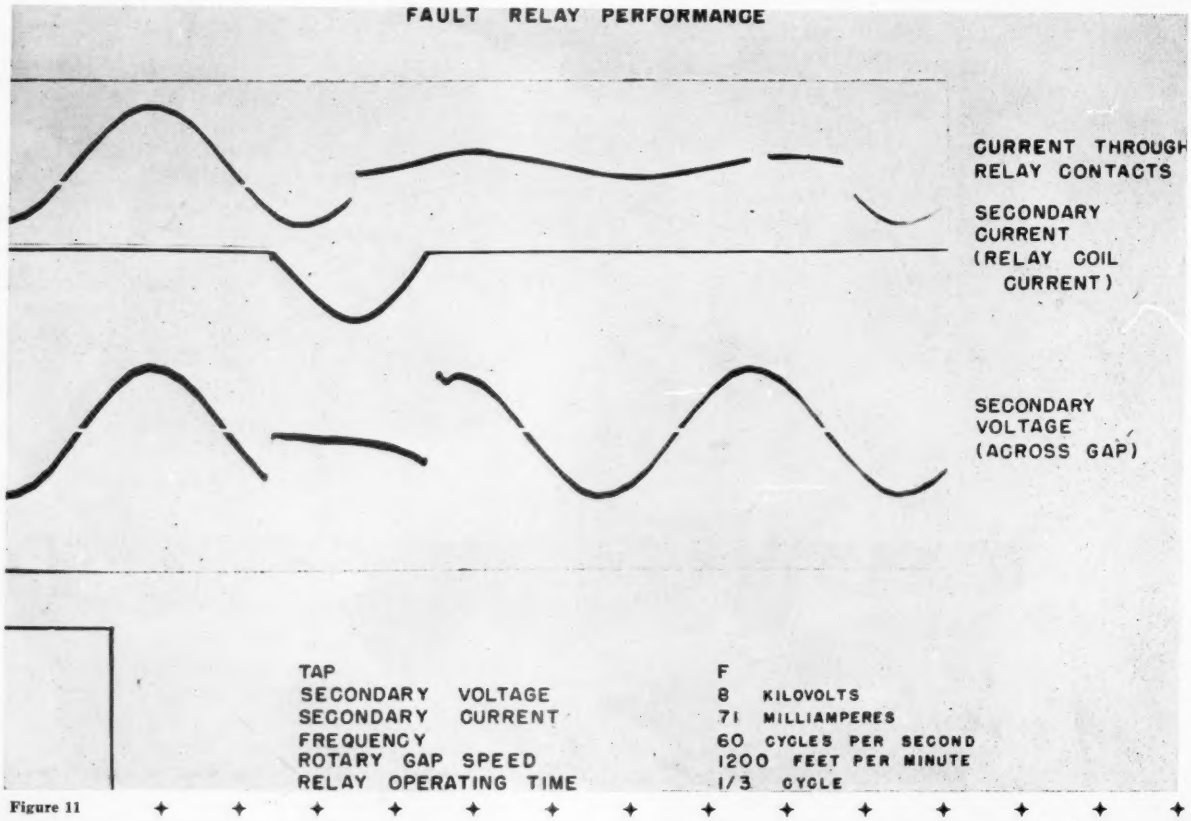
FAULT RELAY PERFORMANCE
CURRENT THROUGH RELAY CONTACTS
SECONDARY CURRENT (RELAY COIL CURRENT)
SECONDARY VOLTAGE (ACROSS GAP)
TAP F
SECONDARY VOLTAGE 8 KILOVOLTS
SECONDARY CURRENT 71 MILLIAMPERES
FREQUENCY 60 CYCLES PER SECOND
ROTARY GAP SPEED 1200 FEET PER MINUTE
RELAY OPERATING TIME 1/3 CYCLE

Figure 11

The Successful Finishing of Electrically Insulated Wire and Cable

By Ralph C. Ellams,

Supervisor, Electrical Coating Development,

Roxalin Flexible Finishes, Inc., Elizabeth F, New Jersey.

PART III
Production Problems and Their Solution

✦ ✦ ✦

PART I—Handling of Protective Coating Prior to Application

and

PART II—Mechanics Application

were published in the July issue.

Incompatability in Reservoir or on Wire

THERE are two usual causes for this condition. The first concerns insulated braided conductor introduced into the lacquer immediately after being saturated. It is not always possible, because of physical property requirements for a saturating compound to be completely compatible with the finished coating in either the wet or dry state. Therefore, it is necessary for the saturated braid to be thoroughly dry before being passed through the lacquer. A partially dried saturated braid is vulnerable to the action of the lacquer solvents and the accumulation of removed incompatible saturant increases until certain portions of the lacquer-saturant mixture are precipitated.

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DURING the preliminary period of contamination, the coating being applied may show no apparent defect but as the film thickness increases, it may exhibit characteristic cloudiness. Invariably, this condition causes failure in specification tests.

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IT must also be considered that even though a saturant is partly compatible with the lacquer in the semi-dry state and no cloudiness is noticeable during coating, the physical properties of the finished coating have most likely been changed if contamination has taken place.

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OBVIOUS corrective measures are:

(a) Make sure the saturant removal gasket is sufficiently tight to prevent surface coating.

(b) Check the tower temperature and air velocity.

(c) Be certain the saturated wire is receiving the requisite number of passes through the tower for adequate drying.

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THE second cause is not so common but has often been experienced. Where the lacquer is permitted to run low in a vessel not adequately covered or not supplied by a closed system, unequal evaporation of the solvents may occur. This may disturb the solvent ba'ance to an extent which precipitates certain portions of the solid content.

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THE corrective measure entails:

(a) Draining the reservoirs and refilling with material taken directly from the drum previously used.

(b) If (a) does not correct the trouble, drain again and try material from another drum if available.

Caution: It is not good practice to add thinner to the reservoir to correct this condition as the solid content or pickup properties may be adversely affected.

Poor Coating Pick-up

POOR pick-up may be due to:

(a) Low viscosity.
(b) Excessive contact in the coating vessel.
(c) Unduly tight gaskets.
(d) Slow speed.
ce) Too much heat.

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CORRESPONDING correctives are:

(a) Check the original consistency of the coating material. In the event this is standard, determine whether thinner has been added. If so, drain the reservoir and start over with material freshly drawn from the drum.

(b) Some finishes have a tendency to wash the film from partially coated braid if the length of contact is too great. If this is suspected, increase the speed consistent with adequate drying. If the lacquer vessel has control tubes, (Fig. 1, Part 2), shorten the length of contact by raising the tube.

(c) Loosen the gaskets. Constant attention should be given to the application device if consistently uniform coating is to be obtained.

(d) Slow speed means longer contact and more washing off. Proceed as in (b).

(e) The hotter the oven, the more thermoplastic the finish, therefore, the more vulnerable to the dissolving action of the solvents in the lacquer. A reduction in temperature may be beneficial.

Excessive Coating Pick-up

EXCESSIVE pick-up is usually easy to correct as it is largely due to:

(a) Loose gaskets.
(b) High viscosity.
(c) Excessive speed.

✦ ✦ ✦

CORRECTION is indicated as follows:

(a) Tighten gaskets or replace those worn to an extent which prevents adjustment.
(b) Drain reservoir and refill with material freshly drawn from the drum.
(c) Excessive speed creates pressure below the wiping orifice thus increasing the amount of lacquer applied. If the gaskets are not adjustable, slow the speed or have the viscosity of the finish reduced. If the gaskets are adjustable, tighten them.

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Irregular Coating

THIS is purely a question of mechanics. It may be due to:

(a) Poorly centered wire.
(b) Unsuitable gaskets.
(c) Excessive heat.
(d) Contamination in reservoir.

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CORRESPONDING corrective measures are:

(a) Determine whether the reservoir or applicator has shifted out of position causing one-sided coating. Also check to be sure whether a wire of much greater, or less diameter than previously coated is now being run. This sometimes requires a slight change in the centering of the applicator.
(b) Gaskets can be unsuitable for a number of reasons. They may be worn unevenly, of wrong design, (see applicators) or simply softened badly through absorption of solvents. Replacement with new ones in which the orifice has been carefully cut or molded usually overcomes the difficulty. Be sure that compression gaskets are countersunk.
(c) Since the finish is thermoplastic, excessive heat may soften it to an extent which causes flattening during passage over the sheaves. The wiping device does not always compensate for this oval shaped wire and an irregular coating results. Often the flat side receives such an excessive amount of lacquer that pinholing or blistering occurs. In this instance, the tower temperature should be reduced and a few thousand feet run to compare with previous production.
(d) Contaminants usually find their way to the gasket orifice because this is the direction in which the lacquer exerts its pressure. Streaks in the coating are traceable to contamination such as dirt or partially dissolved "lacquer skin." This particular annoying condition needs patience in its correction. If the gasket is in good condition, the reservoir should be drained, wiped out and filled again. In a continuous system the individual applicators should be thoroughly cleaned.

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Sleeving

SLEEVING describes the application of a thick gelatinous or nearly dry sleeve of lacquer on the surface of the partially coated wire. It is caused by:

(a) Contamination by partly soluble or insoluable "lacquer skins."
(b) Introduction of air by braid.
(c) Excessive speed.
(d) Gaskets with improperly formed orifices.
(e) Excessive viscosity.

✦ ✦ ✦

POSSIBLE solutions for the above difficulties are:

(a) Thoroughly cleaning the reservoirs or applicators and replenishing the system with new lacquer. Examine the lacquer for undissolved material.
(b-c) Introduction of air by braid, and excessive wire speed are sometimes closely related. In any event, try reducing the speed. If this eliminates the trouble but cuts production below normal expectancy, perhaps the solvent composition of the coating material might be adjusted to clear up the trouble. Excessive wire speed is also tied in with insufficient contact with the lacquer. In the closed system, it may be possible to increase the pressure by increasing the height of the supply source.
(d) A gasket with an irregularly shaped orifice causes "curlicues" of lacquer to collect at the point of wire egress. This is not sleeving but its ultimate effect may well have the same physical appearance. The accumulation sometimes has a jelly-like consistency caused by its inability to dry in the solvent vapor atmosphere. This mass adheres to the wire and is either deposited on the top sheave or compressed on the wire to give the appearance of sleeving.
(e) When the viscosity is excessively high, the material does not flow quickly enough to wet a fast moving strand. Air is introduced by the braided wire and this partially dries the adjacent lacquer. A semi-dry "sleeve" results which may ultimately adhere to the wire and be drawn through the gasket. Maintaining normal viscosity and lacquer level prevents sleeving.

✦ ✦ ✦

Sticking on Sheaves

THE major causes are:

(a) Insufficient drying.
(b) Excessively hot sheaves.
(c) Dirty sheaves.

✦ ✦ ✦

THE relative correctives are quite simple:

(a) Insufficient drying may be due to excessive speed, poor adjustment of gaskets, improperly adjusted heat and air flow. Careful checking of these variables usually indicates the particular cause.
(b) Partially dry lacquer coatings are thermo-plastic. If the sheaves are too hot, the coating is transferred. The temperature at the upper sheave should be maintained at a safe

level—no higher than the temperature at which the air is introduced.

(c) An accumulation of film resulting from (a) or (b) provides a good adhesive to further transfer coating from the strand to the sheave. Keep sheaves clean.

✦ ✦ ✦

Sticking on Adjacent Strands

THIS is somewhat exceptional and happens when the sheaves are too close together or when the tower is so high that the individual strands swing sufficiently to touch. Some coating systems develop a rhythm that sets the wire in lateral motion. Sometimes a change in speed eliminates this swing.

✦ ✦ ✦

SHOULD the condition be chronic, mechanical changes are indicated. It is essential that the top and bottom sheaves be plumb. Loose or worn gears in the driving mechanism should be replaced. Strand tension should be uniform throughout the coating operation. If the top sheaves are driven, permitting one or two to idle on the shaft often relieves uneven tension.

✦ ✦ ✦

IT is true that a rapid and copious exudation of "slip agent" while the coating is being applied prevents sticking on the sheaves and adhesion between adjacent strands. Wherever possible, however, the correction should be made by apparatus control. The incorporation of an excessive amount of incompatible "slip agent" may have an adverse affect on the physical properties and performance of the coating.

✦ ✦ ✦

Flattening of Finish on Sheaves

FLATTENING may be due to:

(a) Poor drying.
(b) Excessive tower temperature.
(c) Excessive speed with resultant high tension.

THE corrective measures for these deficiencies have already been discussed under "Sticking on Sheaves" and "Sleeving." This is a rarely encountered fault with well constructed drying apparatus and modern coating compositions.

✦ ✦ ✦

Blistering

A BLISTER may be defined as a single large hollow elevation caused by the expansion of vapors in the interstices of the braid, Figure 6. Blisters occur after the coating has become continuous and the wire has absorbed sufficient heat for the rapid expansion of trapped solvents. Large diameter cables with heavy braids exhibit this fault more frequently than do smaller wires. This is probably because they warm up slowly and if adequate air flow is lacking, build an accumulation of vapor in the large braid spaces. When the heat takes effect, solvent vapor expansion is rapid, resulting in blisters.

✦ ✦ ✦

IT HAS been the writer's experience that the use of a braid saturant aggravates the condition rather than minimizes it. This, of course, may be due to improper drying of the saturant. However, there is another possibility which should be considered in the analysis of causes. Even though the saturant is dry, it may absorb some of the solvents in the top coating and retard their release. Furthermore, braid blocks may occur which would prevent the even distribution of solvent vapor in long lengths of cable. This blocking, forming localized blisters, would not exist in an unsaturated braid.

✦ ✦ ✦

THIS is not intended to suggest that unsaturated braid is the answer to the blistering problem. The most important corrective is high velocity air flow. If it is not available, a combination of short contact with the lacquer, slow speed and no heat will eliminate the fault. On large diameter wire or cable, precautions should be taken to insure complete drying of the saturant.

✦ ✦ ✦

Pinholing

PINHOLING is an overall condition which manifests itself in small surface holes rarely completely through the film, Figure 7. If the film is sliced with a razor blade and is examined under a magnifying glass, many small pockets will also be observed. The pressure has not been great enough to explode these spaces and the contained solvent vapor has been reabsorbed by the film and evaporated from the surface.

✦ ✦ ✦

THIS is the most difficult to correct of all the imperfections which may occur in wire coatings. Perhaps

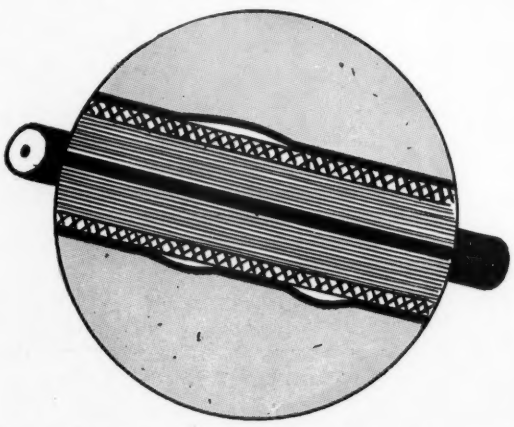


Fig. 6. Blistering.

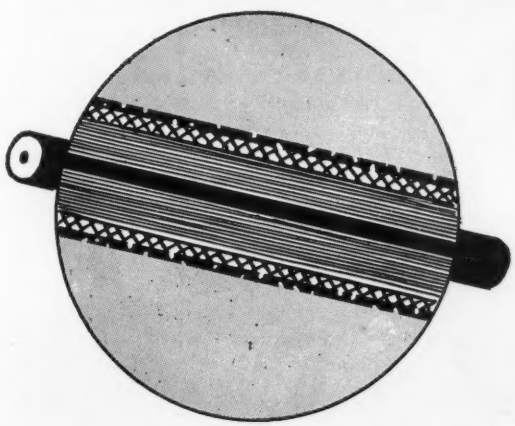


Fig. 7. Pinholing.

the reason is that when high production is necessary, the wire may travel at such a critical speed that slight variations in heat, air flow and gasket adjustment may cause pinholing for periods. Then, without tower adjustment, the pinholing may stop as suddenly as it started.

✦ ✦ ✦

ASSUMING that the solvent balance in the finish is correct, the greatest contributory action to pinholing is increasing the speed of the wire but at the same time making no compensating adjustment in the amount of lacquer applied in each coat. Faster tower speed actually increases the amount of lacquer deposited because of the increased pressure created below the gasket.

✦ ✦ ✦

SINCE temperature, air velocity and speed cannot remain in a constant ratio, a change in speed throws the entire system out of synchronization.

✦ ✦ ✦

AN increase in the tower temperature to obtain faster evacuation of solvent — faster drying — merely accentuates the pinholing. The solution rests with removing the solvents so quickly that there is insufficient volatile portion left in the film to vaporize internally at normal tower temperature.

✦ ✦ ✦

ALL other things being equal, increased air velocity will accomplish this end. It may not be necessary to decrease the temperature because the more rapid evaporation of the solvents will in some measure reduce the actual temperature of the drying film. If this increased air velocity is not a satisfactory solution, the optimum yield of the coating apparatus is being exceeded.

✦ ✦ ✦

STRANGELY enough, although pinholing makes a wire finish look porous, in actuality, it is not. Heat, cold and hot oil tests conducted on heavily coated ignition cable show that with negligible exceptions, pinholed finishes pass stringent tests as well as faultless films. Pinholing, nevertheless, should be eliminated for its degree may suddenly change for the worse.

Coating Deformation on Reeling

WIRE convolutions sometimes tend to become square on their contiguous surfaces, or, if crossed at a wide angle, show deep ridges when tightly reeled. This condition may be the result of:

(a) Insufficient drying.

(b) Too high a temperature in the wire.

(c) Excessive tension on the take-up reel.

✦ ✦ ✦

RELATIVE correctives are:

(a-b) Insufficient drying and high temperatures have already been covered.

(c) All tension on the wire as it leaves the coating apparatus should be absorbed by the take-up capstan. The collecting reel should wind the wire with a minimum of tension and the "slip" mechanism should be very gentle. Both marking and sticking are due to tight reeling.

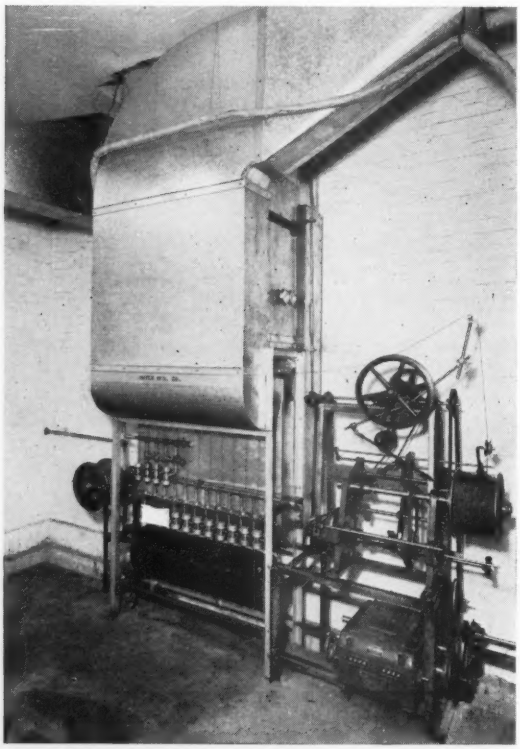


Fig. 8. Main Floor View of Coating Apparatus and Take-Up Mechanism. ✦ ✦ ✦ ✦ ✦ ✦ ✦

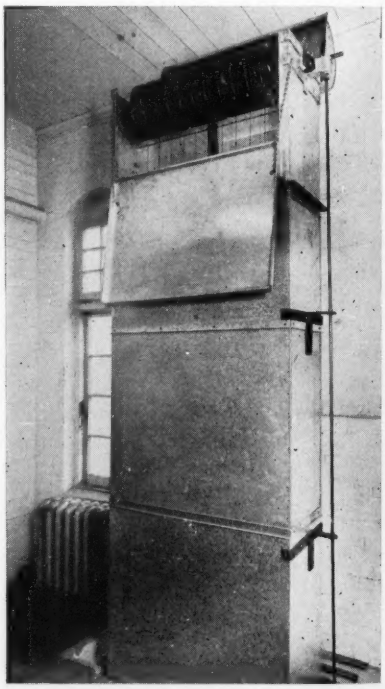


Fig. 9. Second Floor View with Top of Tower Open for Inspection. ✦ ✦ ✦ ✦

(*Please turn to page 589*)

Outstanding Personalities of the Wire Industry

George W. Frick, General Sales Manager Firth-Sterling Steel Co.

APPOINTMENT of **George W. Frick** as General Sales Manager of Firth-Sterling Steel Company has been announced.

✦ ✦ ✦

MR. Frick has been identified with the metal working industries in various capacities since 1913. After serving more than two years with the Marines in World War I, he became a sales engineer of tool and die steels. As a special representative of Crucible Steel Company of America for five years, he promoted nationally the use of alloy steels and stainless steels.

✦ ✦ ✦

IN 1929 he joined Firth-Sterling, and was appointed Manager of the company's Ohio Division in 1930, serving in that capacity until 1941, when he was moved to McKeesport as Manager of the Firthite Division, having charge of the development and marketing of sintered carbide for cutting tools both in this country and for export.

✦ ✦ ✦

MR. GEORGE W. FRICK
General Sales Mgr.
Firth-Sterling Steel Company
McKeesport, Pa.

Roy C. McKenna, President of Vanadium-Alloys Steel Co.

FLOYD Rose has resigned as president of Vanadium-Alloys Steel Co., Latrobe, Pa., and has been succeeded by **Roy C. McKenna,** who will serve as both president and chairman. **R. B. George** was elected sales vice president; **L. D. Bowman,** production vice president, and **F. P. Underwood,** vice president and secretary. **J. P. Gill,** vice president, was appointed chairman of a newly formed executive committee which includes **Messrs. Underwood, George, Bowman** and **Alexander Nimick. J. Cleveland McKenna** was elected a director to fill the unexpired term of Mr. Rose.

✦ ✦ ✦

Calvin Verity, President of Rustless Iron & Steel Corp.

CALVIN Verity, formerly vice chairman and treasurer and a member of the board of directors, Rustless Iron & Steel Corp., Baltimore, has been elected president succeeding **Charles R. Hook,** who was both chairman and president. **W. W. Sebald** was elected first vice president, a new office in the company. **G. D. Moomaw,** formerly vice president in charge of operations and a director, was elected vice president and general manager. He succeeds **C. L. Kingsbury,** resigned. **George W. Clearwater,** assistant treasurer, was elected treasurer.

✦ ✦ ✦

Walter F. Munford, Assistant Vice President, American Steel & Wire Co.

WALTER F. Munford has been named assistant vice president of the American Steel and Wire Company, subsidiary of the United States Steel Corporation. **George A. Gleason** has been made manager of operations of the Worcester, Mass., district, succeeding Mr. Munford. Mr. Gleason was formerly general superintendent of the company's South Works in Worcester.

A. R. Zapp, Carbide Products Manager, Firth-Sterling Steel Co.

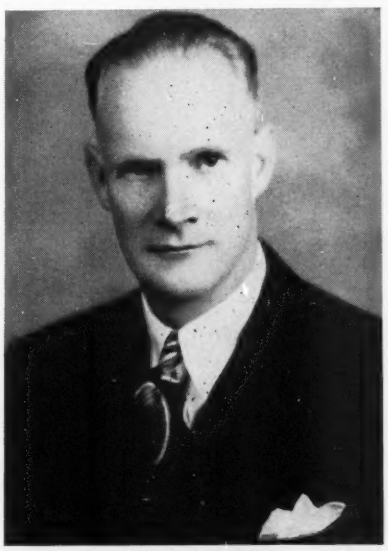
THE appointment of **A. R. Zapp** as Carbide Products Manager of Firth-Sterling Co., McKeesport, Pa., has just been announced.

✦ ✦ ✦

MR. Zapp, an officer in the Navy in the first World War, received advanced engineering training at Stevens Institute of Technology and Annapolis. While associated with Union Wire Die Company, first United States concern to manufacture carbide dies, he participated in the evolution and development of sintered carbide dies from the start.

✦ ✦ ✦

MR. Zapp, who is the author of numerous articles on carbide dies was appointed manager of Firth-Sterling's Firthaloy division in 1932. In cooperation with the Industry Committee on Steel Cartridge Cases, he is credited with contributing to the development of special dies for brass and steel cartridge case manufacturing that made it possible to produce ammunition in unprecedented quantities. He is an active member of the Wire Association and is regarded as being, perhaps, the best wire die man in the industry.



MR. A. R. ZAPP
Carbide Products Mgr.
Firth-Sterling Steel Company
McKeesport, Pa.

(Please turn to page 574)

Outstanding Personalities of the Wire Industry

(Continued from page 573)

Reuben E. Sommer, President of Keystone Steel and Wire Co.

REUBEN E. Sommer, formerly vice president and general manager of Keystone Steel & Wire Co., Peoria, Ill., has been elected president succeeding **W. H. Sommer.** In addition to the presidency Mr. Sommer will continue as general manager.

✦ ✦ ✦

American Steel & Wire Joliet Plant Changes

MARVIN S. Brown has been promoted to superintendent of engineering and maintenance, Joliet plant of the American Steel & Wire Co., Cleveland. He succeeds **John S. Banta,** a veteran of 42 years service who has been named to the newly created position of engineer-special. **Charles P. Pettigrew** has been made works engineer to fill the vacancy created by Mr. Brown's promotion.

✦ ✦ ✦

MR. VAN H. LEICHLITER
General Superintendent
American Steel & Wire Company
South Works, Worchester, Mass.

✦ ✦ ✦

Karl E. Prindle, Vice President in Charge of Product Development, The Dobeckmun Company

THE Board of Directors of the Dobeckmun Company, Cleveland, Ohio, announce the appointment of **Karl E. Prindle** as vice president in charge of Product Development. Mr. Prindle has been associated with the company since April, 1932, coming with them initially to develop improved machine-applied adhesives for the then new cellophane bags of which Dobeckmun was the first manufacturer. At the age of 24, when only one year out of Oberlin College, Mr. Prindle developed Moisture-proof Cellophane for Du Pont under the supervision of Dr. W. H. Charch. This invention vastly increased the uses and markets for cellophane.

✦ ✦ ✦

AT Dobeckmun Company, he heads a staff which has been very active in creating new types of packaging, electrical insulation and other technical specialties required for urgent military uses.

✦ ✦ ✦

(Please turn to page 582)

AMERICAN IRON & STEEL INSTITUTE

SUMMARY OF PRODUCTION OF IRON AND STEEL PRODUCTS

(Net tons)

Product	1944	1943	1942	1941	1940
Pig Iron:					
Basic	45,886,008	45,374,662	43,532,865	39,759,841	33,987,734
Bessemer	9,756,836	10,258,788	9,865,220	9,522,343	7,386,320
Low phosphorus	474,686	538,832	562,672	474,428	448,956
Foundry	2,190,681	2,059,501	2,546,530	2,760,827	2,292,175
Malleable	2,494,659	2,393,241	2,399,520	2,417,137	1,832,401
Forge or mill	...	...	...	1,074	3,590
All other	204,569	185,646	169,137	164,901	120,490
Total	61,007,439	60,810,670	59,075,944	55,100,551	46,071,666
Ferro-Alloys:					
Ferro-manganese and spiegel	809,638	803,623	785,103	730,009	746,896
Ferro-silicon	837,944	923,450	880,843	729,716	498,832
All other	211,177	232,204	161,414	126,328	81,135
Total	1,858,759	1,959,277	1,827,360	1,586,053	1,326,863
Total Pig Iron & Ferro-Alloys	62,866,198	62,769,947	60,903,304	56,686,604	47,398,529
Steel (ingots & steel for castings):					
Open hearth—basic	79,168,294	77,207,870	75,183,065	73,312,851	60,882,840
" " —acid	1,195,659	1,413,934	1,318,892	1,076,768	690,243
Bessemer	5,039,923	5,625,492	5,553,424	5,578,071	3,708,573
Electric	4,237,699	4,589,070	3,974,540	2,869,256	1,700,006
Crucible	25	146	2,010	2,313	1,024
Total Steel	89,641,600	88,836,512	86,031,931	82,839,259	66,982,686
Finished Hot Rolled Products:					
Plates—universal	1,676,100	1,603,247	1,825,372	1,265,964	762,644
" —sheared	11,447,323	11,515,693	9,974,228	4,933,611	3,560,764
Sheets—hot rolled	10,339,080	9,403,002	9,199,273	13,602,685	11,705,956
Strip	2,593,107	2,125,221	1,901,153	2,540,074	2,077,744
Strip and sheets for cold reduced black plate and tin plate	4,177,865	2,982,379	3,281,860	4,328,111	3,103,627
Hoops	68,596	60,884	93,071	108,722	97,074
Cotton ties and baling bands	35,892	46,212	54,895	44,461	44,918
Black plate	556	21,098	238,199	490,811	521,924
Total	30,338,519	27,757,736	26,568,051	27,314,439	21,874,651
Bars—merchant	10,532,250	11,383,501	10,110,222	9,143,455	6,459,263
" —concrete reinforcement	628,944	474,546	1,829,760	1,835,243	1,425,998
Total	11,161,194	11,858,047	11,939,982	10,978,698	7,885,261
Structural shapes—heavy	3,824,106	3,349,377	4,944,670	4,670,782	3,355,658
" " —light	852,375	1,226,467	871,651	1,053,454	876,688
Sheet piling	128,879	36,970	152,688	209,183	186,125
Rails	2,490,656	2,126,996	2,096,159	1,927,851	1,678,986
Splice bars and tie plate bars	862,383	583,798	745,150	742,382	515,928
Skelp	3,049,682	3,022,398	2,900,741	3,637,574	2,709,000
Blanks or pierced billets	3,677,631	3,470,797	3,039,174	2,945,921	2,320,966
Wire rods	4,646,298	4,693,798	4,632,017	5,268,423	4,351,848
Rolled forging billets	3,762,575	3,796,931	2,881,687	1,769,816	919,826
Blooms, billets, etc., for export	468,088	825,966	1,194,636	1,158,519	1,677,905
Car wheels (rolled steel)	291,529	233,915	234,794	269,911	191,102
All other	250,064	309,477	244,514	377,234	116,425
Total Hot Rolled Products	65,803,979	63,292,673	62,445,914	62,324,187	48,660,369

GOVERNMENT WIRE PRODUCTION INFORMATION

Joint Army-Navy Termination Regulation

THE Joint Army-Navy Termination Regulation (revision No. 1, 20 April 1945) is a complete reprint of this "Bible" of contract settlement. The basic principles of the original Joint Termination Regulation (referred to as "the JTR") remain unchanged, but the total number of necessary amendments made a complete reprint desirable in order to prevent confusion and the need of cumbersome insertions. Revision No. 1 should be substituted **in its entirety** for original JTR, issued last November. A summary of the most important changes follows:

✦ ✦ ✦

Interim Financing

ONE of the major difficulties in the settlement of terminated contracts is the problem of enabling subcontractors, both immediate and more remote, to obtain partial or complete payment on their termination claims. The revision of the JTR has taken four concrete steps in the direction of solving this problem: (References, unless otherwise indicated, are to paragraphs of the JTR.)

✦ ✦ ✦

1. War contractors having required qualifications may obtain, directly from the Government, a loan without interest to create a fund from which partial and final payments may be made to subcontractors, under prime contracts with services of the War Department and with bureaus of the Navy Department (364).

✦ ✦ ✦

2. Partial payments may now be more widely obtained by war contractors for the purpose of making partial and final payments to their subcontractors.

3. In the Navy, certain material inspectors in the field have been authorized to approve partial payments not exceeding $25,000, obviating the necessity of obtaining the approval of the contracting officer in Washington (314.2, 351.1, 362).

✦ ✦ ✦

4. War contractors may use funds in advance payment accounts to make partial and final payments to subcontractors under the conditions now set forth in the revised Regulation (332).

✦ ✦ ✦

Advance Preparations for Termination Settlements

MANY of the decisions which must be made when termination comes can be made in advance of termination as well. The more planning a war contractor does in advance of termination, the more

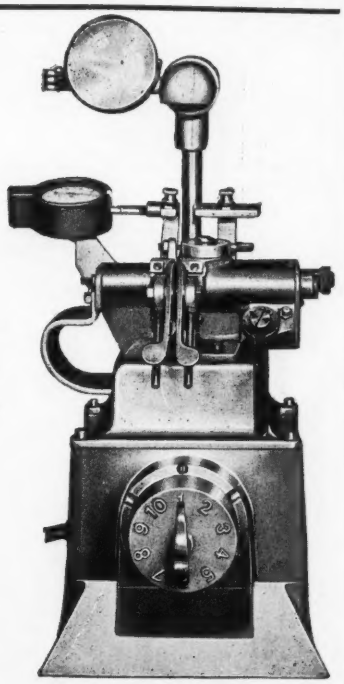
(Please turn to pege 576)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



Model E.-I-S Welder Capacity .010 to .062" high & low carbon wire.

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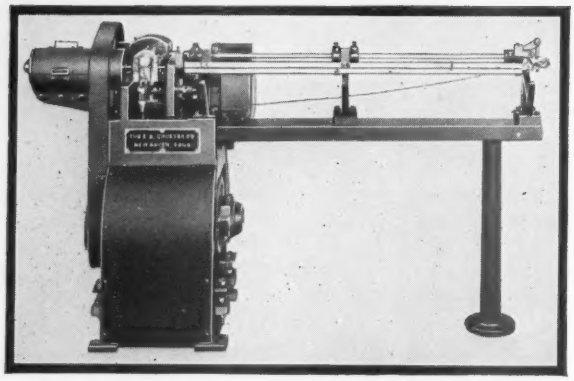

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Wire Capacity 1/32" - 1/16" Diameter

Faster Cutting Speeds
GREATER PRODUCTION!

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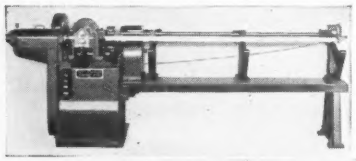
Outstanding Features—

Almost continuous wire travel
Lightning cut-off assures square-cut ends
High speed, direct driven 5-die straightening flier
Quiet, highly efficient V-belt motor drive
Ball and roller bearings throughout
Extremely rigid construction
Fully guaranteed as to material and workmanship

Descriptive folder on request



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1/16" - 3/16"
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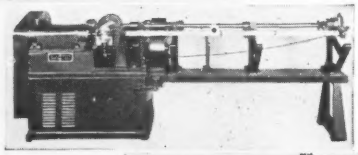

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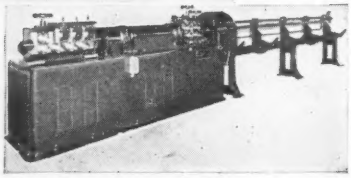

Type 3A
3/16" - 3/8" Dia.

Type 4A (not shown)
3/8" - 5/8" Dia.

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SHUSTER
Automatic
WIRE STRAIGHTENING
AND CUTTING
MACHINES
Since 1866

Government Wire Production Information

(Continued from page 575)

quickly he will be able to resume normal production and take the steps necessary to settle his claim after termination.

✦ ✦ ✦

A COMPLETE discussion of such advance planning is included in this revision of JTR (220-227.4). Advance preparations for termination settlements may take three forms. First, discussions between representatives of the contractor and of the Government will familiarize each other with the problems that will arise and the procedures to be followed upon termination. Second, such discussions may lead to informal understandings, which, although not binding, may, if conditions have not changed, serve as the basis for settlement upon termination. Finally, formal binding agreements may be entered into covering the entire field of decisions which must be made in settling a contract after termination. Moreover, upper tier contractors may promote prompt settlement of termination claims by similar advance planning with their subcontractors. A form of pretermination settlement agreement is included in the revised Regulation.

✦ ✦ ✦

Authorization to Settle Subcontract Claims

UNDER the JTR prior to its amendment certain war contractors were authorized to make final settlements not exceeding $10,000 with their subcontractors and partial payments not exceeding $10,000 to their subcontractors, where the subcontracts were terminated as a result of the termination of a prime contract. This type of authorization has now been extended to apply also to fixed-price subcontracts terminated as a result of the modification of the prime contract or under any other circumstances which will require the Government to bear the cost of settling the termination claim of the subcontractor. The method of computing the size of the claim which may be settled has been amended to broaden the authorization (642.3, 987.1).

Removal of Government-owned Plant Equipment

WAR Department policies and procedures are set forth, governing the disposition of Government-owned plant equipment installed in contractors' plants under leases or other contracts with the War Department (860-869). Within sixty days, or longer period as agreed, after a request has been received from the contractor in satisfactory form, the War Department will remove such equipment from a contractor's plant. Other provisions cover dismantling, packing, shipping, storage, and other disposition. The War Department's policy is to waive, wherever possible any restrictive clauses in contracts which would impede prompt reconversion, provided that the contractor in turn promptly waives or exercises any option which he may have to purchase the equipment. This policy will assure more prompt plant clearance and also permit prompt determination of what equipment is surplus and available for sale by disposal agencies.

✦ ✦ ✦

Settlement Procedures Relating to Cost-plus-a-fixed-fee Contracts

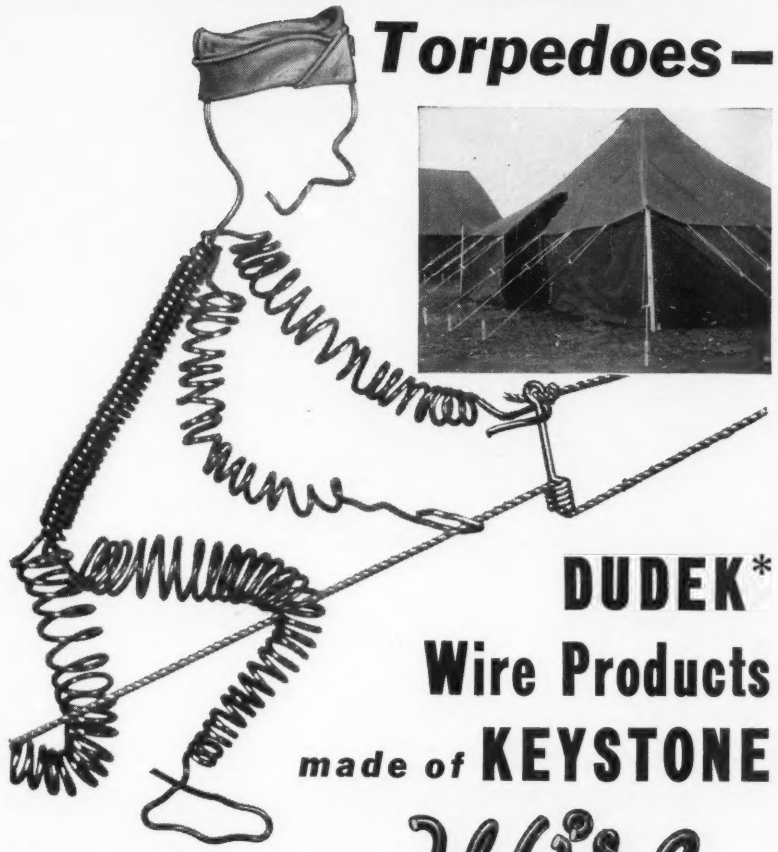
MAJOR changes in the procedures for settling terminated cost-plus-a-fixed-fee contracts have been in effect in the War and Navy Departments for several months. These changes, which are incorporated in the present amendment, were designed to speed up the settlement of these contracts and to make settlements complete and final.

✦ ✦ ✦

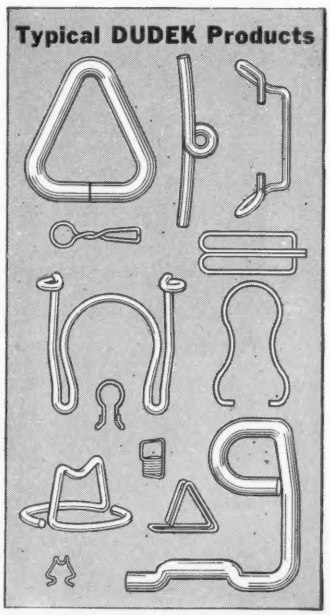
THESE new procedures provide improved methods of coordinating the respective activities of the contracting service or bureau and the General Accounting Office prior to settlement. After termination and as a part of settlement procedure, the General Accounting Office is requested to furnish the contracting officer within 60 days all relevant information which has come to the attention of that office in connection with its audit of the contract. Unless the information indicates that here are exceptions of the General Accounting Office, the contracting of-

(Please turn to page 578)

For Tents – Tanks – Torpedoes –



DUDEK* Wire Products made of KEYSTONE Wire



A large percentage of Dudek products are made from wire, resulting in items of every conceivable shape and form. These items serve as essential parts of planes, tanks, torpedoes and other materiel . . . literally thousands of uses.

The adaptability of Dudek's production is fully matched by the Keystone wire used. Keystone UNIFORMITY in tensile strength, analysis, gauge and finish are vitally important factors in Dudek's quality products.

**William Dudek Manufacturing Company Chicago, Illinois*

KEYSTONE STEEL & WIRE CO.
PEORIA 7, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE
REG. U.S. PAT. OFF.
KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Coppered, Tinned, Annealed, Galvanized

Government Wire Production Information

(Continued from page 577)

ficer is then in a position to negotiate the final settlement. If exceptions are still outstanding, an additional period of 30 days is allowed for their clearance. Contracting officers are not authorized to include in the settlement any costs which are the subject of uncleared exceptions, but may refer such matters to the Under Secretary of War or the Secretary of the Navy for instructions.

Other Important Changes

ALL the regulations issued to date by the Office of Contract Settlement, and certain regulations of other Government agencies are now incorporated in appendice (together with the Contract Settlement Act of 1944 which was printed in the original JTR). The method of calculating interest payable to war contractors is simplified and condensed (570-577). Cutback procedures in the War and Navy Departments have been substantially modified to reflect and implement recent regulations and directives of the Office of War Mobilization and Reconversion and of the War Production Board (230-238). In the field of termination inventory (400-497), a number of changes were made to clarify and improve existing procedures, but no fundamental modifications were made pending issuance by the Surplus Property Board of new price regulations. Recent developments and policies in the Consolidated Termination Program for assigned contractors are reflected, to avoid duplication effort by contractor and Government personnel, in accounting and property disposition work (820-829). The functions of the Termination Coordination Committees have been considerably amplified, and the organization and function of the Audit Coordination Committees have been added (830-837). Certain changes in the instructions to prime contractors and subcontractors, necessitated by consistency with the revised Regulation, have been made (931.1, 943.2, 944.3). A new, extensive index has been added.

✦ ✦ ✦

Shortage of Diamond Powder is Developing

WORLD stockpiles of diamond powder (crushed bort) will be virtually exhausted by 1947 as consumption is running approximately 35 per cent in excess of the current available supply, War Production Board officials told members of the Industrial Diamond Industry Advisory Committee at a recent meeting.

✦ ✦ ✦

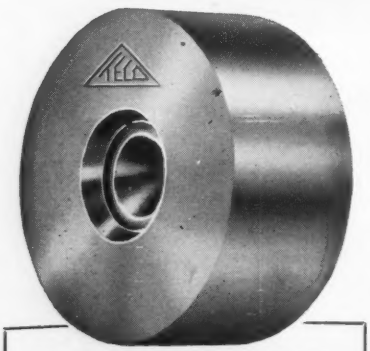
PRODUCTION of crushed bort increased 50 per cent in 1944 over 1943, but demand still continues far in excess of supply, officials of WPB's Miscellaneous Minerals Division disclosed.

✦ ✦ ✦

WPB reported that Great Britain had indicated its willingness to maintain present shipments of bort to this country through the balance of 1945 and 1946 even though shipments are exhausting stockpiles. In 1947, however, world consumption will be limited to approximately current production.

4 BIG BENEFITS FROM 1 SIMPLE CHANGE*

1. More tonnage per die
2. Smooth on-size finish
3. Less die changing
4. Lower die cost



WIRE and BAR DIES • SIZING DIES
EXTRUDING DIES • TUBING DIES
Carbide Blanks, Tools, Bits,
Reamers, Broaches, Forming Tools

*A CHANGE TO TECO CEMENTED CARBIDE will enable you to substantially step up wire production, while cutting cost per ton and cost per die.

Replace your present carbide dies with TECO Cemented Carbide, on any machine. Run exactly as before — then check the extra tonnage produced.

TECO Cemented Carbide has greater resistance to wear and pitting because it is harder, denser, more uniform. Send details of your operation — or have one of our engineers discuss your needs. Write today.

TUNGSTEN ELECTRIC CORPORATION — 564 39th St., Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

TECO
Pioneers in Tungsten Carbides for over a Quarter Century
CARBIDE DIES

INDUSTRIAL diamonds for drills are in a somewhat similar position. Demand exceeds supply. Beginning in 1946, stockpiles will also be exhausted and world consumption will be limited to current production.

✦ ✦ ✦

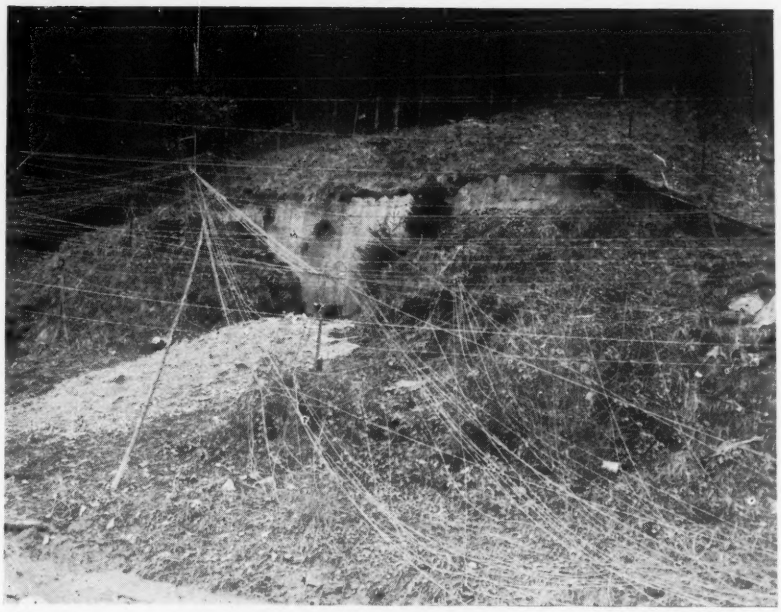
Shortage of Protective Coatings

ALL types of paints, varnishes and lacquers will continue in short supply for the duration of the war in the Pacific, the Chemicals Bureau of the War Production Board emphasizes.

✦ ✦ ✦

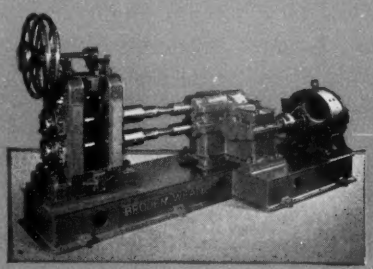
BAKED or forced-drying synthetic enamels and lacquers required for coating production line items are in barely sufficient supply to meet current military requirements, WPB said. However, the supply of these quick-drying finishes is slowly improving and it is believed that by the fourth quarter requirements for certain highly essential civilian reconversion programs such as the new domestic mechanical refrigerator and washing machine programs can be met.

(Please turn to page 581)

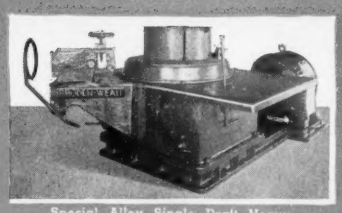


Web-work of U. S. Army field wires carries communications between front-line troops and rear areas, Germany. (1) ETO HG 44-28350. ✦ ✦ ✦ ✦ ✦ ✦

WEAN-BRODEN



Small Cold Rolling Strip Mill



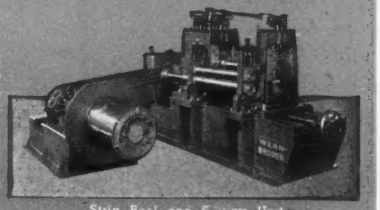
Special Alloy Single Draft Heavy Duty Vertical Wire Drawing Block for ⅝" Round Wire

THE Wean Engineering Company, Inc., have long been recognized as specialists in sheet, strip and tin mill equipment . . . The Broden Construction Company specializes in the manufacture of narrow strip and wire mill equipment.

With the extended facilities of The Broden Construction Company as a subsidiary of The Wean Engineering Company, Inc., it is now possible to serve the steel industry more effectively.

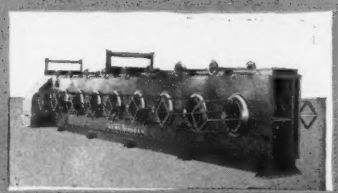
COLD ROLLING MACHINERY
For 36" Wide Material and Narrower
Mills • Reels • Slitters • Levelers • Coilers
Edgers • Scale Breakers • Shears
Scrap Ballers • Continuous Pickling

WIRE MILL EQUIPMENT
Wire Drawing Machines • Patenting
Galvanizing and Tinning Take-Up Frames
Wire Flattening • Spoolers • Nail
Galvanizing and Blueing



Strip Reel and Shearing Unit

HOLMQUIST BARBED WIRE and WIRE FENCE MACHINERY



The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.

A Review of Recent Wire Patents

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

No. 2,377,397, FASTENING MEANS, patented June 5, 1945, by James H. Booth, Detroit, Mich., assignor to Thompson Products, Inc., a corporation of Ohio.

✦ ✦ ✦

This is a two-piece wood screw, having a screw threaded, pointed lower shank, and an upper head portion which may be detachably coupled thereto.

✦ ✦ ✦

No. 2,377,876, METAL CLEANING PROCESS AND COMPOSITION, patented June 12, 1945, by Harvey N. Gilbert, Niagara Falls, N. Y., assigner to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

✦ ✦ ✦

A process for removing metal oxide from the surface of a metal article composed of a metal substantially non-reactive with alkali metal hydroxides is provided and comprises immersing the article in a molten composition comprising at least one alkali metal hydroxide having about 1 to 20% by weight of alkali hydride dissolved therein, at a temperature below the melting point of the article.

✦ ✦ ✦

No. 2,378,024, STRIP COILING APPARATUS, patented June 12, 1945, by Chester M. MacChesney, Chicago, Ill., assignor to Acme Steel Company, Chicago, Ill., a corporation of Illinois.

✦ ✦ ✦

A cylindrical core having a number of resiliently mounted suction cups adapted to engage and hold a metal strip coming into engagement with the core, and a device for adjusting the mountings of the suction cups to vary the positions of their strip engaging portions.

✦ ✦ ✦

No. 2,378,625, BEDSPRING, patented June 19, 1945, by Charles J. Elder, Muncie, Ind., assignor to The Moore Company, Muncie, Ind., a corporation of Indiana.

✦ ✦ ✦

Sheet metal strips are associated with wire coil springs in this assembly, as well as wire tensioning springs interconnecting adjacent strips with their ends also embracing the associated ends of the wire coil springs.

✦ ✦ ✦

No. 2,378,992, ARTICLES FOR USE AT LOW TEMPERATURES, patented June 26, 1945, by Russell Franks, Niagara Falls, N. Y., assigner to Electro Metallurgical Company, a corporation of West Virginia.

✦ ✦ ✦

A steel article for use at low temperatures, which article is composed of a steel containing about 15% to 20% manganese to render said steel austenitic, about 0.2% to 8% of at least one austenitic-stabilizing element selected from the group consisting of nickel and copper, the copper content not exceeding about 3% of the steel, 0.01% to 0.5% carbon and the remainder iron and incidental elements having to substantial adverse effect on the low temperature of the steel.

✦ ✦ ✦

No. 2,379,993, COLD ROLLED MANMAGESE STEELS, patented June 26, 1945, by Russell Franks, Niagara Falls, N. Y., assignor to Electro Metallurgical Company, a corporation of West Virginia.

✦ ✦ ✦

Cold drawn or otherwise cold worked steel, resistant to progressive rusting is provided and is composed substantially of manganese between 15.5% and 20%, nickel between 0.25% and 4.5% chromium between 0.25% and 7%, remainder iron.

✦ ✦ ✦

No. 2,378,994, COLD ROLLED MANGANESE STEELS, patented June 26, 1945, by Russell Franks, Niagara Falls, N. Y., assigner to Electro Metallurgical Company, a corporation of West Virginia.

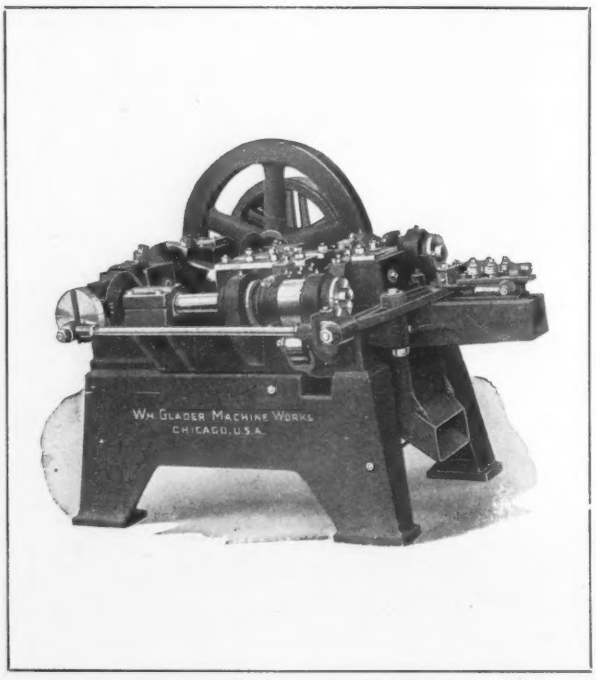
✦ ✦ ✦

Steel article of manufacture in the condition produced by cold drawing, cold rolling, or similar cold forming operations are, in this patent of manganese between 15.5% and 20%, copper 0.25% to 1.75%, remainder substanially iron.

✦ ✦ ✦

No. 2,379,066, POLISHING STAINLESS IRON AND STEEL, patented June 26, 1945, by Irvine C. Clingan, Baltimore, Md., assignor to Rustless Iron and Steel Corporation, Baltimore, Md., a corporation of Delaware.

GLADER HIGH SPEED WIRE NAIL MACHINE



High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 NO. RACINE AVE.

CHICAGO, ILLINOIS

The method comprises polishing chrome-nickel material by anodic treatment and the steps are: Immersing the metal to be treated in a bath containing 60% to 90% by weight of concentrated sulphuric acid and the remainder water, and passing direct current through the bath of a density of 6 to 12 amperes per square inch of the treated metal surface for such period of time as to prevent gray etching of the treated metal and to polish it while using the metal as the anode and while maintaining the bath at a temperature of approximately 30° C. to 50° C.

✦ ✦ ✦

No. 2,379,075, ENAMEL COMPOSITION, patented June 26, 1945, by John W. Garrison, Cleveland, Ohio, assignor to General Electric Company, a corporation of New York.

A zinc borosilicate enamel is provided, which comprises boric oxide and silica in an amount equal to approximately 50 per cent by weight of the total composition, and zinc oxide in an amount at least about equal by weight to that of any other single constituent, the boric oxide, silica and zinc oxide constituting approximately 75 per cent by weight of the total composition further containing oxides of aluminum, cadmium and barium in a total amount of approximately 10 to 15 per cent, and approximately 8 to 15 per cent of alkali oxides.

✦ ✦ ✦

Government Wire Production Information

(Continued from page 579)

Prices for Coil Wire

WHOLESALE and retail mark-ups for coil wire used in new automatic and semi-automatic hay baling machines were announced by the Office of Price Administration recently.

✦ ✦ ✦

THESE mark-ups are 20 per cent over the carload cost to the jobber at the wholesale level, and 33-1/3 per cent of the permissible cost at the retail level.

✦ ✦ ✦

THE mark-ups effective July 14, 1945, are in line with those established for single loop bale ties, traditionally used in hay baling.

✦ ✦ ✦

MILL ceiling prices for the coil wire used by the machines, which varies in size and type of packaging according to type of machine, are currently being calculated for farm machinery makers. A representative type of wire used is 16-gauge hay baling wire in 45-pound even weight coils, the base ceiling price of which is $2.75 per 100 pounds before additions of extras for coiling and packaging.

✦ ✦ ✦

(Order 18 to Revised Price Schedule No. 49—Resale of Iron and Steel Products—effective July 14, 1945.)

✦ ✦ ✦

WPB Acts to Speed Equipment Deliveries

AN amendment of General Industrial Division Table 6, Order M-293, designed to speed up delivery of the more essential unfilled rated orders for certain types of equipment. Two of these of interest to our field are listed:

1. Subdivision 14 covering resistance welding equipment. WPB said that the demand for this item is also critical, largely because of new military programs. Manufacturers have average backlogs of six or seven months. A substantial portion of the high rated orders on their books are for maintenance, repair and operating supplies.

✦ ✦ ✦

2. Subdivision 15 covering wire working machinery. The need for additional facilities for making field and assault wire, for electric motors, fuse springs and heavy ammunition, WPB explained, is critical and the present demand exceeds supply. The number of manufacturers is limited, and backlogs are around five months.

NEW
HAND TOOL
★ FAST
★ EASY TO USE
★ LIGHT WEIGHT
USED IN HAND
USED IN VISE
HUBBARD WIRE SPLICER
Splices annealed wire from .009 to .022 gauge. Speeds up, simplifies wire splicing jobs. Light thumb pressure operates tool . . . nontiring. Positive action provides exact number of turns required. Shown above is standard 5-turn size . . . any other size as ordered. IMMEDIATE DELIVERY. Write for complete information.
ARMY E NAVY
HUBBARD SPOOL COMPANY
1624 CARROLL AVENUE | CHICAGO 12, ILLINOIS
Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.
PLANTS AT CHICAGO, ILLINOIS AND GARRETT, INDIANA

Outstanding Personalities of the Wire Industry

(Continued from page 574)

Keystone Steel & Wire Personnel Changes

RECENTLY announced changes are the election of **Henry G. Sommer,** formerly executive vice president and treasurer, as chairman of the board of directors, a newly created position; **D. P. Sommer,** formerly vice pesident and general superintendent, as executive vice president in charge of operations; **W. O. Fritze,** formerly secretary and assistant treasurer, as vice president and treasurer; **Walter V. McAdoo,** formerly secretary to the Executive Committee and Director Public Relations, as vice president and secretary.

✦ ✦ ✦

C. H. Granger Appointed General Manager of Wheeler Insulated Wire

FORMAL announcement is made of the appointment of **Charles H. Granger,** general manager of the Waterbury Tool Company, division of Vickers, as general manager of the Wheeler Insulated Wire Company of Bridgeport. Mr. Granger will succeed Arthur Slapian, who has expressed a desire to be retired.

✦ ✦ ✦

MR. Granger, a native of Waterbury, has been active in local industrial circles since 1903 when he became associated with the Benedict & Burnham Company, which is a part of the American Brass Company. He became associated with the Waterbury Clock Company in 1908 and in 1942 when he resigned he held the positions of president and general manager. He has served as chairman of the Price Adjustment Board of the Springfield Ordnance district.

✦ ✦ ✦

THE Wheeler Insulated Wire Company is presently engaged 100% in war production and plans an elaborate post-war program of expansion. It specializes in magnet wire, coils, fluorescent ballast and and other electrical accessories.

Berton H. DeLong, Paul B. Greenawald, New Vice Presidents, Carpenter Steel Co.

AT a recent meeting of the Board of Directors of The Carpenter Steel Company, Reading, Pa., **Berton H. DeLong** and **Paul B. Greenawald** were appointed directors and vice presidents of the company.

✦ ✦ ✦

IN his new post, Mr. DeLong will continue to supervise the research and development work of the company. He has been associated with the company since 1910, holding the post of chief metallurgist since 1916.

✦ ✦ ✦

MR. DeLong graduated from Cornell University. He is a member of the American Iron and Steel Institute and Iron and Steel Institute of Great Britain, a member of the American Society for Testing Materials, the Society for Automotive Engineers, as well as a Fellow of the American Association for the Advancement of Science.

✦ ✦ ✦

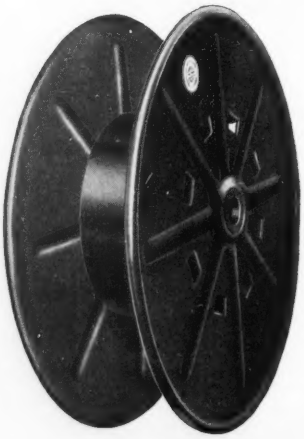
MR. **Greenawald** is a graduate of the Pennsylvania State College,

MOSSBERG **PRESSED STEEL** CORP.

Greater service from a new All Welded Steel Take Off Reel designed to meet present day requirements.

Usual maintenance expense eliminated by adoption of this new design wherein all parts are welded into one homogeneous unit.

Reel sides are embossed with radial reinforcing ribs for increased rigidity with rolled edges for additional strength and to facilitate handling.



All Welded Steel Take Off Reel

Complete line of spools and reels for both processing and shipping all kinds of bare and insulated wires and cables. (Send for Catalogue W-104)

MOSSBERG
PRESSED STEEL CORP.
18 West Street
Attleboro, Massachusetts, U. S. A.

James Day (Machinery), Ltd., "Ford House," 88 Regent Street, London, W. I., England.

a member of the American Society for Metals, and is serving on the labor relations committee of the American Iron and Steel Institute. He will be in full charge of mill production. Before assuming his duties as general superintendent, Mr. Greenawald was metallurgical engineer for the company for 21 years.

✦ ✦ ✦

North-American Philips Co., Inc., Announces Promotions

DR. **O. S. Duffendack,** Director of Research for **North American Philips Company, Inc.,** has been appointed Vice President and Director of Research and Engineering, according to an announcement by **O. M. E. Loupart,** Executive Vice President, who also announced the appointment of **E. J. Kelly,** at present Manager of Manufacturing, as Vice President and General Factory Manager.

✦ ✦ ✦

DR. Duffendack was formerly Professor of Physics at the University of Michigan. During the war he has been a director of research with the National Defense Research Committee and serves as chief of one of its sections.

✦ ✦ ✦

MR. Kelly will have charge of the manufacturing activities of the Company's three plants now producing quartz crystals, electronic tubes, electronic equipment, X-ray apparatus, fine wire and tungsten and molybdenum products. He was formerly Works Manager of the Camden plants of RCA, having been there for 25 years.

✦ ✦ ✦

Fred A. Emm, General Superintendent, Rustless Iron & Steel Corp.

APPOINTMENT of **Fred A. Emm** as general superintendent of the plant of the Rustless Iron and Steel Corporation here has been announced by G. D. Moomaw, vice president and general manager. Mr. Emm has been superintendent of the Wire Mill since he came to Rustless in 1935.

✦ ✦ ✦

PRIOR to coming to Baltimore Mr. Emm was with the Crucible Steel Company in Syracuse, N. Y., with the Mond Nickel Company in Clearfield, Pa., and with the International Nickel Company in Huntington, W. Va. Much of his experience in the steel industry has been in connection with the manufacture and processing of special alloy and stainless steel wire, bar, and tubes.

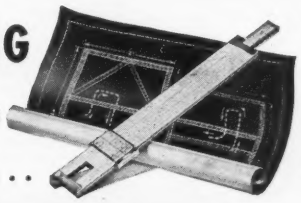
✦ ✦ ✦

Howard E. Kingdon, Chief Engineer, Transformer Dept., Eisler Engineering Corp.

THE Eisler Engineering Company, Newark, N. J., announces the appointment of **Howard E. Kingdon** to the post of Chief Engineer and Manager of the Transformer Department.

(Please turn to page 584)

OVEN ENGINEERING NEWS



Wherever You See This Nameplate . . .

You'll Know That { 1. Producton has been increased. 2. Cost has been reduced.

A lot of people are beginning to wonder what we **do** make, because we seldom advertise the same equipment twice. The answer is simply that we make **anything** in the field of oven materials handling and processing. We suggest that you keep the following list and call us when you have a production problem. We design standard and special equipment for:

WIRE INDUSTRY

- Complete insulation lacquering and saturating systems*
- Constant-tension, variable-speed windup machines*
- Continuous windup and unwind systems*
- Friction payoff stands*
- Saturation systems
- Lacquer pots*
- Drying and preheating rooms*
- Wire and cable lacquer baking ovens
- Experimental solvent resin systems*

FERROUS WIRE AND ROD

- Dehydrogenizing ovens
- Welding rod coating ovens*

HEAT TREATING

- Draw furnaces*
- Dehydrogenizing ovens*
- Blueing ovens
- Thermal shock systems*

** Indicates standard sizes and types of these units are available.*

FREE DATA

Much of the above listed equipment is fully described in our FREE engineering book, "Blueprint for Industry — Part II."

(This is No. 8 of a series. Reprints of previous advertisements will be sent free upon request.)

ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY
11621 DETROIT AVE., CLEVELAND 2, OHIO
Engineering Representatives in Principal Industrial Areas

* ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND *

Outstanding Personalities of the Wire Industry

(Continued from page 583)

MR. Kingdon, born in Michigan in 1899, received his engineering degree from the University of Michigan in 1923. After taking the General Electric Test Course and Advanced Engineering Course, he entered the Transformer Engineering Department of General Electric Company of Pittsfield, Mass. In 1925, he was appointed Chief Transformer Engineer of English Electric Co. of Canada and was given the additional duties of Assistant Manager of that Company in 1929. In 1934 he joined the Commonwealth Electric Corporation Limited, Welland, Ontario, as Chief Transformer Engineer and Assistant Manager in 1937 he was made Works Manager of the Transformer Division, which position he held until recently. Mr. Kingdon assumed his new duties on July 1, 1945.

✦ ✦ ✦

Norman F. Melville, Manager of Sales, Steel and Wire Products, Pittsburgh Steel Co.

NORMAN F. Melville, for the past year on leave from Pittsburgh Steel Co. for duties with War Production Board in Washington, D. C., has returned to the Company in his former capacity, Manager of Sales, Steel and Wire Products. He was in the Steel Division of WPB as Deputy Chief of the Wire and Cold Drawn Bar Branch.

✦ ✦ ✦

Procedure for Replenishing Copper Wire Mill Warehouse Stocks

PROCEDURES to be followed by copper wire mill warehouses in replacing, establishing and increasing stocks, now that the Controlled Materials Plan has been "open-ended," were outlined recently by the War Production Board.

✦ ✦ ✦

THE procedures are set forth in Direction 4 to CMP Regulation 4 and deal with (1) the replacement of copper wire mill products delivered on authorized controlled material orders, which are in the categories of "Warehouse Stock Replacement Order" or "Warehouse Deferred (ZW) Order"; (2) the placement of unrated orders to establish or increase stock; and (3) the treatment of the several types of copper wire mill warehouse orders by controlled material producers and other warehouses.

✦ ✦ ✦

BY a provision of the direction, copper wire mill warehouses are no longer required to file Form 3009, except when specifically instructed to do so by WPB. All previous instructions and directions dealing with replacement, establishment, or increase of warehouse stocks have been revoked.

✦ ✦ ✦

Diamond Die Controls Revoked

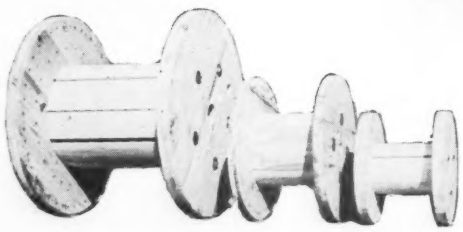
BECAUSE the production of diamond dies is now in excess of the current requirements, Order M-181, controlling their allocation, has been revoked. Diamond dies are used principally in the drawing of fine wire needed for radio and radar equipment, WPB said.

✦ ✦ ✦

Eisler Engineering Marks 25th Anniversary

IN June of 1920, **Charles Eisler** founded the **Eisler Engineering Company** of Newark, New Jersey.

WOODEN . . . REELS



RETURNABLE and NON-RETURNABLE

For CABLE, ROPE and WIRE

(from 12″ to 96″ in diameter)

These reels are made to customers' specifications in an up-to-date plant. Production methods assure lowest possible costs. Reels are sturdy and will withstand severest handling.

We can also make your reel heads for steel drums

Let us quote on your requirements

The BRIDGE MFG. CO., Inc.

HAZARDVILLE, CONN.

Prior to this, Mr. Eisler was employed by Westinghouse in the capacity of Machine Designer and Chief Engineer.

✦ ✦ ✦

DURING 25 years of fundamental and pioneering research, the Eisler organization has grown into a large progressive plant, internationally recognized and distinguished for its many contributions to the radio tube and lamp industries. The company is commemorating a quarter of a century of service to industry with a special anniversary catalog. This unique catalog is a striking commentary on the historical background and a revealing picture of the Eisler organization. Profusely illustrated with more than 4000 machine and methods illustrations, it is replete with useful information and technical data for the electronic glass working industry, and its numerous branches. It will make an invaluable addition to engineering libraries and company records. Those wishing copies are invited to write directly to the Eisler Engineering Company, 760 South 13th Street, Newark 3, New Jersey.

✦ ✦ ✦

George D. Hartley

AS WE go to press we are saddened by news of the death of **George D. Hartley**, 372 May Street, Worcester, Mass. A formal obituary is not necessary where George Hartley is concerned as he was well known throughout our industry besides having many friends abroad, all of whom will realize that they have lost a splendid friend, a grand character and an expert in his chosen profession. Through many years' friendship with George Hartley our editor feels privileged to express deep regret and a profound sense of loss at his passing.

An ADVERTISER likes to know his ads have been read so please mention WIRE & WIRE PRODUCTS when writing him.

TUNGSTEN CARBIDE DIES for HEADING and

WIRE AND TUBE DRAWING (.030" to 2"), EXTRUSION (1/16" to 1"), RECUTTING AND WELDING ELECTRODE COATING.

RING GAUGES
DIAMOND DIES (.0015" up)
DIAMOND POWDER IN ALL GRADES

AIRCRAFT EXTRUSION DIES

As a special service to customers, we are prepared to give three day service on standard wire, tube and extrusion dies in cases of extreme urgency.

Address Inquiries to

MICHIGAN WIRE DIE CO.

11152 Chalmers Avenue
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DRAW YOUR WIRE THE MODERN WAY with

GILRON COATING COMPOUNDS

A big step forward in wire drawing. Thoroughly proven in mill practice. Makes possible wire drawing speeds heretofore considered impracticable. Increases die life, prevents scratching of wire, produces better finish and eliminates use of lime in many cases.

These coating compounds are of particular value in the more difficult operations—stainless, alloy, high carbon and welding rod wire. Multiple reductions can be drawn without re-coating.

Coatings for Drawing Stainless, Alloy, Low and High Carbon and Copper Coated Wires

Let us confer with you. Write or telephone for particulars.

GILRON PRODUCTS COMPANY

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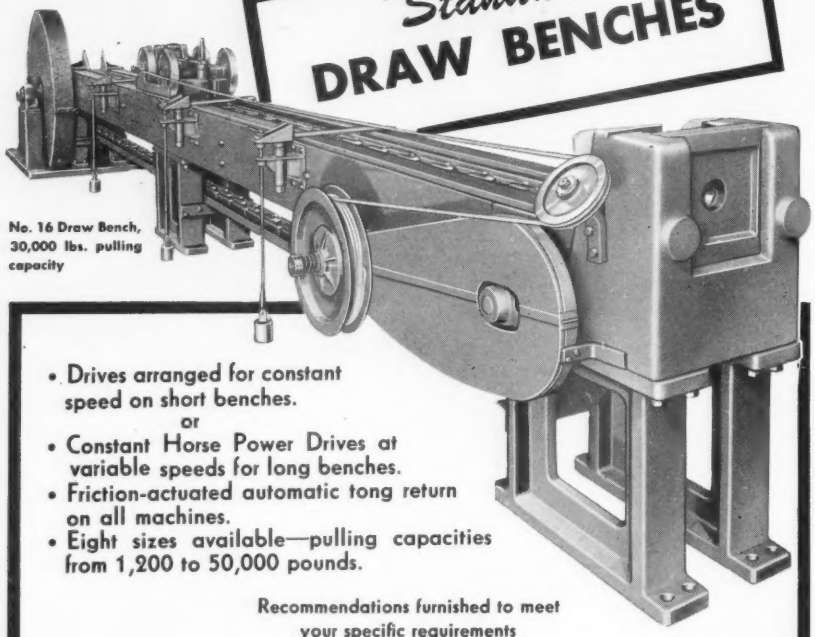
Telephone HEnderson 8375

"Standard"
DRAW BENCHES

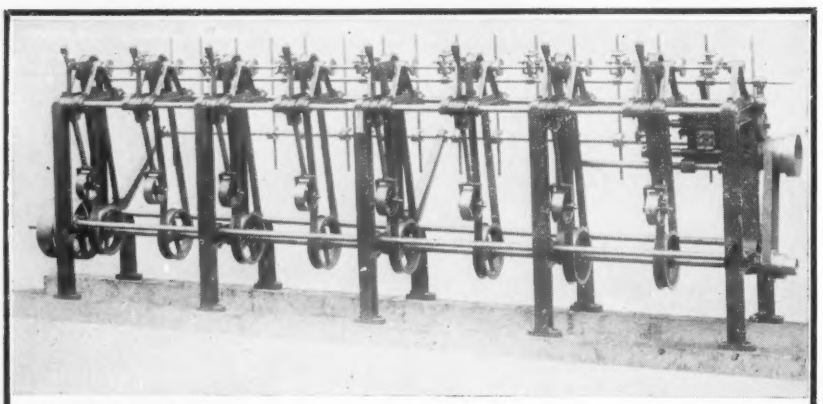


No. 16 Draw Bench, 30,000 lbs. pulling capacity

- Drives arranged for constant speed on short benches.
  or
- Constant Horse Power Drives at variable speeds for long benches.
- Friction-actuated automatic tong return on all machines.
- Eight sizes available—pulling capacities from 1,200 to 50,000 pounds.

Recommendations furnished to meet your specific requirements

STANDARD MACHINERY COMPANY
1545 Elmwood Ave., Providence 7, R. I.



No. 1900E SPOOLER

WIRE SPOOLING MACHINES

Model illustrated takes spools up to 12" diameter. Floor space required: 19" x 10'; length can be varied to suit largest spool specified. Handles wire up to .050" diameter. Other models made to suit specific requirements.

EMORY SPOOLERS are built for years of continuous service. Precision made, durable, rugged, dependable.

BUILDERS OF WIRE SPOOLING MACHINERY for A HALF CENTURY

For details, write to

ROBERT J. EMORY COMPANY
31 East Runyon Street
NEWARK 5, N. J.
Telephone Bigelow 3-4415

Production Process Improvements at A. P. Newall & Company, Ltd., Glasgow, Scotland

IN a recent letter from **A. P. Newall, M. I. Mech. E.** and managing director he advises of several changes in his plant which are of interest to other wire mills.

✦ ✦ ✦

Chilled Cascade Deep Freezer Equipment

ONE of the outstanding events is undoubtedly the addition of a Chilled Cascade Deepfreeze equipment. Some of the figures obtained in the way of increased tool life are very astonishing. For example, we have had trimming dies on the National Boltmaker which have trimmed 568,000 bolts against a best before of 100,000 and that after three grinds when the die was finished, so you will see that this is a big step forward. In pointing tools, the figures have gone up from 10,000 to 33,000, but I think probably quills and cut-off tools have shown the most remarkable improvement, where, in the case of the former, the increase has been from 3-4 days to 20-25 days production, and, in the case of the latter, from 2-3 days to 12-20 days production. We find that this deep-freezing of tool steel is very various and, while certain tool steels react most favourably, we do not get the same improvement in others, but, in every case, the treatment has proved worth while.

✦ ✦ ✦

New Pickling Room

HOWEVER, what I would most like to tell you about is a new pickling room that is just being completed. It has a good many features which are in some ways unique, and I feel certain that your readers will be interested to know about it. Owing to the limitation of our site, we were restricted to a narrow building, the dimensions being 280 feet long by 35 feet wide and 21 feet high. We have adopted a Portal roof which is eminently suitable for this type of structure where acid is being used. But probably the most outstanding feature of the building is that there are no windows in the normal sense, and the light is provided by means of glass bricks which are built into

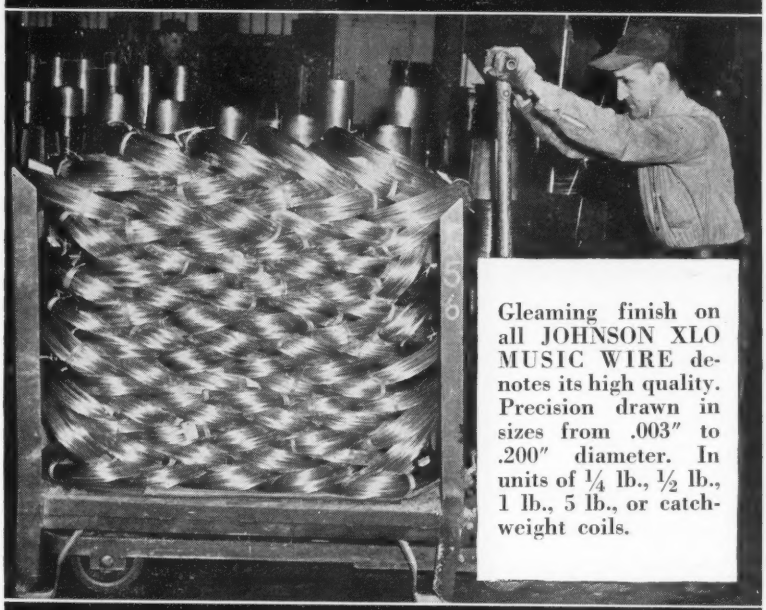
the walls in the form of windows. A pickling room, of course, does not demand a great deal of light, but we think we will get an ample supply by this method. There is an overhead crane with capacity of 2 tons, and the coils will be moved about by means of hooks on a beam picking up about 30 cwt. at a time. They will be made of Monel metal and should, we anticipate, give us a good life. An interesting feature is that it has been decided to use Keebush tanks made by the Kestner Evaporator & Engineering Company. The reason for this decision was not so much that we were dissatisfied with the type of tank we had used previously as it was needed to conserve space to the utmost limit possible. The tanks are 23 feet long by 4 feet 6 inches wide by 5 feet 6 inches deep and are set at right angles to the length of the Shop, and are sunk to 2 feet below floor level. This type of tank is only ¾ inch thick and, as the total thickness of wall in the other type of tank was about 3 feet, it meant a very big advantage from our point of view. We are using 6% sulphuric acid and are taking delivery of our supplies from tank wagons at a strength of about 85%. The tank we are installing has a capacity of 10 tons, and is made of mild steel, lead lined. We are processing in the normal way; that is to say, picking up the coils on the hooks and dropping into the tanks which are to be heated with submerged combustion supplied by our friends in Hammond, Indiana. There is no need for me to elaborate this system of heating, as, no doubt, the readers of "Wire and Wire Products" are entirely familiar with it already, but I may say it has not been used extensively, so far, in this country. It had been our intention to heat the lime with immersion burners, but I decided that, as the supply of steam coming from our new central boiler house was rather more than we required, it would be better to utilize that. The usual washing operation takes place between pickling and liming and is done in a Keebush tank which can be adapted later, if need be, as an addition to our pickling.

✦ ✦ ✦

ONE great point about the type of tanks we are installing is a

(Please turn to page 588)

JOHNSON *Wire*



Gleaming finish on all JOHNSON XLO MUSIC WIRE denotes its high quality. Precision drawn in sizes from .003″ to .200″ diameter. In units of ¼ lb., ½ lb., 1 lb., 5 lb., or catch-weight coils.

JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS.
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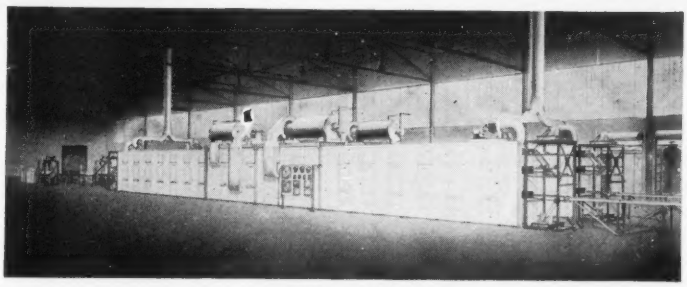
MORE PRODUCTION IN LESS TIME *with*

CARL-MAYER HI-SPEED
ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and paterts pending.**

CARL-MAYER FURNACES, OVENS



WELDING ROD OVEN

For drying coated welding rods. Uses the "Mayer" Recirculating Gas Fired Air Heater principle and Rod Transfer Systems (patents pending).

Growing interest in our type of equipment is evidenced by Carl-Mayer installations in such plants as:—

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Warner

BELL-MINE LIME

for

WIRE DRAWING

Warner COMPANY

BELLEFONTE DIVISION
BELLEFONTE, PA.
Sales Offices
Philadelphia-Pittsburgh-New York

Production Process Improvements

(Continued from page 587)

lip fume extractor, and the suppliers assure me that we shall practically have an acid-free atmosphere.

✦ ✦ ✦

Birlec Flash Baker

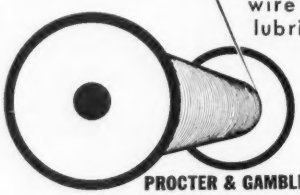
A NEW feature is that instead of a gas-type Flash Baker, which we have used with great success for many years, I have decided, on this occasion, to use a Birlec Flash Baker. This company are old friends of mine and, indeed, I placed one of their earliest orders with them after they commenced business. This type of Baker has a fan at either end and air is circulated over the elements by this means. The capacity is 9 tons per hour and it has a rating of 250 k.v.a. Our method of baking is to coat the lime first and then bake, repeating this about four times, in order to build up a satisfactory drawing surface, and, from our experience, we have found it to operate most satisfactorily.

FOR MAXIMUM "MILEAGE" AND FINISH CONTROL IN YOUR WIRE DRAWING OPERATIONS USE P&G SOAPS

For drawing both ferrous and alloy wires—in either dry or wet operations — you can depend upon these important qualities in Procter & Gamble soaps:

Excellent Adherence
Efficient Lubrication
Minimum Dusting
Uniformity
Economy

One of our representatives will be glad to discuss wire drawing lubricants with you.



PROCTER & GAMBLE, CINCINNATI

If you are a WIRE MAN - - -

JOIN THE

WIRE ASSOCIATION

The Wire Association is a non-profit organization of wire mill executives, superintendents, foremen, metallurgists, plant engineers and all others engaged in the production of cold drawn bars, rods, wire, strip, insulated wire and cable, and the manufacture of wire products, cold headed, extruded and other cold worked products—both ferrous and non-ferrous.

Its purpose is to improve production methods and afford a clearing house for ideas on managements and technical problems in all phases of practical wire drawing and working and to develop and maintain friendly relationship within the industry.

The Association exists and is designed expressly to be of service to you. It costs you only $10.00 a year to belong, and besides the many services that will be available to you as a member, you will receive Wire and Wire Products each month and a copy of The Annual Buyers Guide.

Send for complete information or write today saying you would like to join.

Richard E. Brown, Exec. Sec'y

THE WIRE ASSOCIATION

300 Main Street Stamford, Conn.

Waste Acid Disposal

THE question of effluent was one which had given a great deal of vexation, but I finally came to the conclusion that the simplest and least expensive method of dealing with this problem was to discharge the spent acid into a comparatively small brick tank made of acid-resisting blue bricks, and to put in water from the tap to whatever extent was deemed necessary to get proper dilution for discharging to the sewer. There is, obviously, no limit to what one can do in that direction, and, on investigating the question of cost, I am satisfied that water from the tap will prove the least expensive and certainly the most simple way of dealing with this trouble.

✦ ✦ ✦

Acid Recovery

A GOOD deal of time was spent over the question of acid recovery, but I came to the conclusion that the "game was not worth the candle".

Faster Smut Removal After Pickling!

Removal of carbon smut after pickling is essential in the fabrication of high quality wire. That's why so many wire manufacturers are using QUICK-ACTING Oakite Composition No. 24 for this important job.

This material speedily, thoroughly removes carbon smut, yet leaves sull coat intact . . . helps cut down wear of valuable dies. Write today for complete details on how Oakite Composition No. 24 can expedite YOUR manufacture of better wire . . . there's no obligation!

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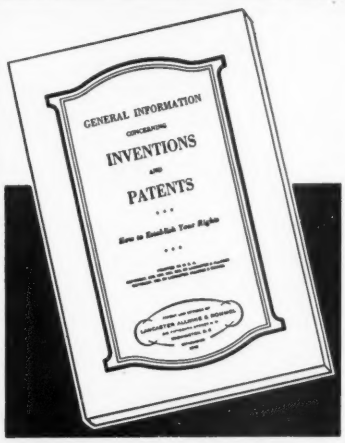
Technical Service Representatives Located In All Principal Cities of the United States and Canada

OAKITE — Buy Bonds for Victory
MATERIALS . . . METHODS . . . SERVICE



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Lancaster, Allwin & Rommel
Registered Patent & Trade-Mark Attorneys
438 Bowen Bldg., Washington, D. C.

The Successful Finishing of Electrically Insulated Wire and Cable

(*Continued from page 572*)

Sticking on Reeling

AFTER the insulated wire has received its protective coating, it is usually collected on large reels. Excessive adhesion between strands often causes stripping of the protective film from the braid when the finished wire is re-reeled for shipment. The major causes for this condition are:

(a) Insufficient drying.
(b) Reeling at high temperature.
(c) Insufficient lubricating agent in the lacquer.
(d) Too much tension on the take-up reel.

✦ ✦ ✦

THE corrective measures for (a) and (b) are apparent and need no further elucidation. An adequate lubricant content, (c), is a problem for the supplier of the finish and should be simple of solution. Excessive tension on the take-up reel is discussed under, "Coating Deformation on Reeling."

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Lamination of Coats

LAMINATION in the film evidences itself by lack of adhesion between any or all of the individual coats. In a badly laminated film, each coat may be peeled from the preceding one down to the braid.

✦ ✦ ✦

SINCE a heavy continuous coating provides maximum physical protection, it is apparent that thin unbonded laminae may easily be stripped during the processing and installation of the wire. Complete bonding throughout the film thickness is indispensable for best performance.

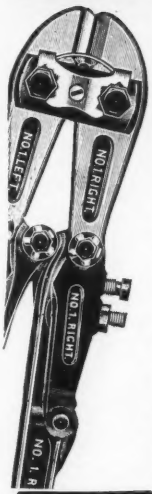
✦ ✦ ✦

LAMINATION may be caused by:

(1) Extremely thorough drying in connection with short contact with coating material.
(2) Gaskets too tight.
(3) Excessive exudation of incompatible lubricating oil on the

(*Please turn to page 590*)

More **POWER TO YOUR HANDS**



With a Porter cutter you can cut hard wire (with center cut round edge jaws), spring wire, wire fabric, tie wire — anywhere, easily and quickly.

There is a standard Porter tool for every cutting job. Special heads designed for special operations.

A special Bench Cutter for stranded airplane control cable. Write for catalog of Porter cutting tools.

H. K. PORTER, INC.
Everett 49, Mass., U.S.A.

PORTER HKP CUTTERS

ACID AND ALKALI PROOF
LININGS AND MORTARS

●

ACID PROOF
CONSTRUCTION

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THE CEILCOTE CO.
Consulting and Research Engineers
750 ROCKEFELLER BLDG.
CLEVELAND, OHIO

APCO MOSSBERG STEEL REELS & SPOOLS

Standard Equipment in War as in Peace

Apco Mossberg Steel Reels are standard throughout the wire industry – and for good reason! Apco Mossberg – the original Frank Mossberg Co. – *originated* the steel reel idea and have been training workmen in their manufacture ever since. That is why Apco Mossberg Steel Reels are preferred where the pressure of wartime production schedules is heaviest.

FREE ENGINEERING SERVICE

We will gladly submit drawings, blueprints, or suggestions without obligation to you. Write for quotation today.

APCO MOSSBERG CO.
(The Original Frank Mossberg Co.)
21 Lamb Street . . . Attleboro, Mass.

WIRE CUTTING and SHAPING MACHINES, FINE WIRE WELDERS

We make Spot Welders from ¼ to 500 KVA & all Types Butt Welders

Automatic Drawing and Cutting Mach.

Eisler fine wire cutting and forming machines have been in use over twenty-five years.

Wire Cutting & Annealing Mach.

Bench Type Butt Welder

Spot Welder

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EISLER ENGINEERING CO., 747 So. 13th St., near Avon Ave., Newark 3, N.J.

WIRE MACHINES FOR
Drawing, Enameling, Tinning, Spooling, Insulating with Glass, Asbestos, Paper Tape, Cotton, etc. Multiple Pull-outs, Rubber covered wire Panners, etc.

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"American" INSULATING MACHINERY COMPANY
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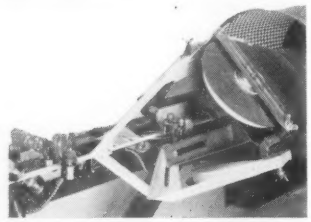
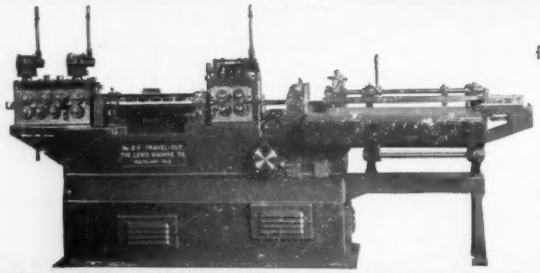
PHILADELPHIA PENNSYLVANIA U.S.A.



TAPING MACHINES
for Wire and Cables using either Concentric or Eccentric mounted Pads of Tape.

LEWIS TRAVEL-CUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to ¾" rod
Round
Square
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Hexagon
Ferrous and Non-Ferrous

Automatic
High Speed
Heavy Duty

The Sign of Dependable Service:
WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

The LEWIS MACHINE Co., 3445 E. 76 St., Cleveland, O.

The Successful Finishing of Electrically Insulated Wire and Cable

(*Continued from page 589*)

surface during coating.

(4) Discontinuous coating, namely: applying a group of coats, removing the wire from the tower, then reintroducing it for further coating.

✦ ✦ ✦

THESE causes are all related to insufficient solvent attack on each preceding coat. Corresponding corrective measures are:

(1) Increase the time or distance the wire contacts the lacquer.

(2) Open the applicators to apply more material even if a few passes must be eliminated. This would be advantageous because production would not be retarded.

(3) This is a problem for the lacquer suppliers. A service call is indicated.

(4) If possible, revise the mechanical features of the tower to accommodate the complete coating procedure in one continuous operation. Provided this is not possible, it may be advisable to pass the wire through a bath of active or slowly evaporating thinner before reintroducing into the tower. Although this sometimes helps, it is not good practice unless there is no other alternative.

✦ ✦ ✦

Conclusion

CERTAIN of the more important subjects in this article have been covered in some detail. Such coverage is not intended to be all encompassing but rather to serve as a base for further thought on the subject.

✦ ✦ ✦

THROUGH a cause and effect analysis, an attempt has been made to present the fundamentals necessary for a reasonable understanding of the factors which contribute to the successful application of coatings by present methods.

✦ ✦ ✦

FURTHER advances in mechanics and in methods of drying will be made. Developments in high frequency dielectric heating may aug-

ment adequate ventilation without exhibiting the detriment of surface heating by radiation. New raw materials having new and useful properties will surely make their appearance. Tomorrow holds the answers.

✦ ✦ ✦

New Besco Spot Welding Tweezers

IT is now possible to unite tiny, almost inaccessible elements of a product by probing for the parts, bending and holding them and welding, with an ingenious device that hooks on to your present spot welding equipment—the new Besco spot welding tweezers.

✦ ✦ ✦

THIS accessory consists of a pair of insulated, forged, copper tweezers with plastic covered, flexible, copper leads terminating in a pair of lugs which connect in place of regular welding electrodes. Developed originally to weld radio tube wires .003" O.D., the spot welding tweezers will find manifold applications in the manufacturing of small precise units, instruments, toys, optical goods, jewelry, household ware, luggage, etc.

✦ ✦ ✦

INSTEAD of carrying parts to be welded to the welding equipment, electrodes may now be applied directly to the elements to be joined. They operate on from ½ to 1 KVA on 10 Amp current, and are used with a timer which cuts the current and times the length of the weld.

✦ ✦ ✦

A SAMPLE pair of the tweezers may be obtained from the manufacturer for $1.25. They are made by New Jersey Jewelers' Supply, 280 Plane Street, Newark 2, N.J. Patents are pending.

AD THOUGHT

ADVERTISING is a service to a magazine's readers. Methods, materials, and machinery are developing under the stress of war. Both editorial matter and advertisements keep you informed on what is happening in industry.

Wartime

Wire for a thousand uses

Versatile Continental wire is produced in sizes from 34 gauge to ½ inch, in standard and special shapes . . . and in a wide range of analyses, tempers and coatings.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA
(The Superior Sheet Steel Co., Canton, Ohio — a subsidiary)

CONTINENTAL STEEL CORPORATION ★ SUPERIOR WIRE

CONTINENTAL SUPERIOR STEEL

CONTINENTAL STEEL CORPORATION

SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc

WIRE: Bright Basic, Annealed, KONIK, Copper ed, Tinned, Special Manufacturer's, etc.

"Steelskin Brands"

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Lubricants for Dry and Wet Drawing of Ferrous and Non-ferrous Wire, Tubing, and Deep Drawn Parts

"STEELSKIN" No. 9 Wire Drawing Powder

Specially dried and finely ground sodium high titre soap for high speed and high carbon wire drawing.

R. H. MILLER COMPANY, INC.

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Established 35 Years

WIRE MEASURING MACHINE

FOR LINEAR MEASURE

PROVIDES NEW STANDARD OF ACCURACY

Illustration Shows Exclusive Patented "3V" Principle

Measuring twisted, armored, bare or insulated wire without vibration or inaccuracies at any speed or varying speeds!

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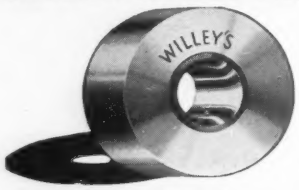

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- EXTRUSION
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They have exceptional abrasion resistance, are free from porosity and take a high polish. Standard one-piece round dies from stock in many sizes. Four classifications from blank and rough cored nibs to finished dies, ready to use.

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Diamond and Carbide Wire Drawing Dies Discussed in a Series of Papers

A METHOD for the inspection of diamond die settings using the X-Ray that has been developed in America in the laboratories of the **Kelley - Koett Manufacturing Co.,** Covington, Ky., is described in a paper that appeared in the January, 1945, issue of Industrial Diamond Review, 41 Tudor Close, Belsize Ave., N.W.S., London, England, recently sent to us by **P. Grodzinski,** Technical Consultant.

✦ ✦ ✦

ANOTHER paper entitled "The Die Room" takes up diamond and carbide dies, discusses personnel training, ventilating and illumination, benches, machines, auxiliary equipment storing and so forth. This appeared in September, 1944.

A THIRD paper from their July, 1944, issue covers recommendations for the use of diamond drawing dies, and is a practical and valuable treatise on the subject.

✦ ✦ ✦

MR. Grodzinski advises that the publisher will be glad to furnish reprints of these articles free of charge.

✦ ✦ ✦

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✦ ✦ ✦

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✦ ✦ ✦

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General Electric Co. Foresees High Output in Post-War Period

HIGH production by **General Electric Company** is expected to continue after the global fighting ends with a peace that will generate new demands in large volume for quality products, Charles E. Wilson, president of the company, said recently in a statement accompanying the organization's 191st quarterly dividend to stockholders.

✦ ✦ ✦

MR. Wilson pointed out that the average annual sales volume of the company advanced from $300,000,000 to $1,300,000,000 in response to the wartime demand for the company's products and the development of new fighting apparatus, such as the jet engine for the fastest plane in the world and the central control gunnery system for the B-29 Superfortress.

✦ ✦ ✦

"IN my considered opinion that billion-dollar growth is no temporary phenomenon, but represents in large part real industrial muscle power," Mr. Wilson said.

✦ ✦ ✦

"THIS belief is based, first, on the pent-up demands for our many products and services for consumers; second, on the need to replace existing industrial machinery and equipment necessarily kept overlong in service during the war; finally, there are the amazing new things which the maturing electrical industry has to offer — television and frequency-modulation radio; the expanded applications of electronics in industry, communications, and research; chemical and metallurgical developments such as silicones and powerful magnets that have unfolded before our eyes; the ingenious and versatile gas turbine; new sources and methods of lighting the world that has always been too dark; literally millions of new homes which will fittingly reflect the progress of modern men."

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Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Hartley Wire Die, Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Hartley Wire Die, Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Works, Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING & PRE-HEATING ROOMS
Carl-Mayer Corp., Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

DRYING EQUIPMENT
Carl Mayer Corp., Cleveland, Ohio.

ENGINEERS—Consulting Wire Mill
Lewis, Kenneth B., Worcester, Mass.
Wiel, L. D., New York, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCES AND FENCING—Wire
Wickwire Spencer Steel Co., New York, N.Y.

FIREBRICK REFRACTORIES—Brick and Cement
The Babcock & Wilcox Co., New York 6, N.Y.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, Ohio.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

WHERE TO BUY, Continued

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Galvanizing Equip.
Electric Furnace Co., Salem, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Hard'ing & Temp'ing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corporation, Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING KETTLES
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, Ohio.

INSULATING MATERIALS—
Angier Sales Corp., Framingham, Mass.
Cheney Bros., New York, N. Y.
Crepe-Kraft Co., Newark, N. J.
Dobeckmun, The, Co., Cleveland, Ohio.
Du Pont de Nemeurs, E. I. & Co., Wilmington, Del.
Owens Corning Fiberglas Corp., Toledo, O.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LIME—
Warner & Company, Philadelphia and Belle Fonte, Pa.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY— Coilers
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J. (for Tungsten Wire)
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Mach'y Co., Phila., Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Carboloy Co., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Oven Engineering Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Fence
Broden Construction Corp., Cleveland, Ohio
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark 3, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY— Forming
Eisler Engineering Co., Newark 3, N. J.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

WHERE TO BUY, Continued

MACHINERY—Material Handling
Cleveland Tramrail Div. o' the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio.
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio.
Lewis Machine Co., The, Cleveland, Ohio.
Moslo Machinery Co., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, Jas. L., Pawtucket, R. I.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co, Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up
Entwistle, Jas. L., Co., Pawtucket, R. I.
Industrial Oven Engr. Co., Cleveland, Ohio.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark 3, N. J.
Nilson, A. H., Co., Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIP.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co, Torrington, Conn.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburg, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Philadelphia, Pa.
Industrial Oven Engr. Co., Cleveland, Ohio.

OVENS—Dehydrogenizing
Carl-Mayer Corp., Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

OVENS—Industrial
Carl Mayer Corp., The, Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.
Moslo Machinery Co., Cleveland, Ohio.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER—Insulating
Angier Sales Corp., Framingham, Mass.
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott Testers, Inc., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES & FITTINGS—Acid Resistant
Ceilcote, The, Co., Cleveland, Ohio
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, Ohio.

POTS—Lead Melting
National Annealing Box Co., Washington, Pa.
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

WHERE TO BUY, Continued

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Industrial Oven Engr. Co., Cleveland, O.
Moslo Machinery Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Synero Machine Co., Perth Amboy, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., Inc, Hazardville, Conn.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Traverse
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Wooden
Bridge Mfg. Co., Inc., Hazardville, Conn.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, Ohio.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Proctor & Gamble, Cincinnati, Ohio.
Shell Oil Co., Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, Ohio.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass,
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPRINGS—Steel
Wickwire Spencer Steel Co., New York, N. Y.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRAND—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

STRIP METAL TESTERS—
Scott Testers, Inc., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Ceilcote Co., The, Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.

TANKS—Pickling
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
National Annealing Box Co., Washington, Pa.

TENSILE TESTERS—
Scott Testers, Inc., Providence, R. I.

TESTING INSTRUMENTS—
Davis, R. L., Electric Co., Wallingford, Conn.
Scott Testers, Inc., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TRAVERSES—
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Philadelphia, Pa.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Oven Engr. Co., Cleveland, Ohio.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Non-Ferrous to Specification for Special Purposes
Hudson Wire Co., Ossining, N. Y.
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Stainless Steel
Firth-Sterling Steel Co., McKeesport, Pa.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott Testers, Inc., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

YARNS AND TAPES—
Cheney Bros., New York, N. Y.
Dobeckmun Co., The, Cleveland, Ohio.
Du Pont de Nemours, E. I. & Co., Wilmington, Del.
Owens Corning Fiberglas Corp., Toledo, O.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

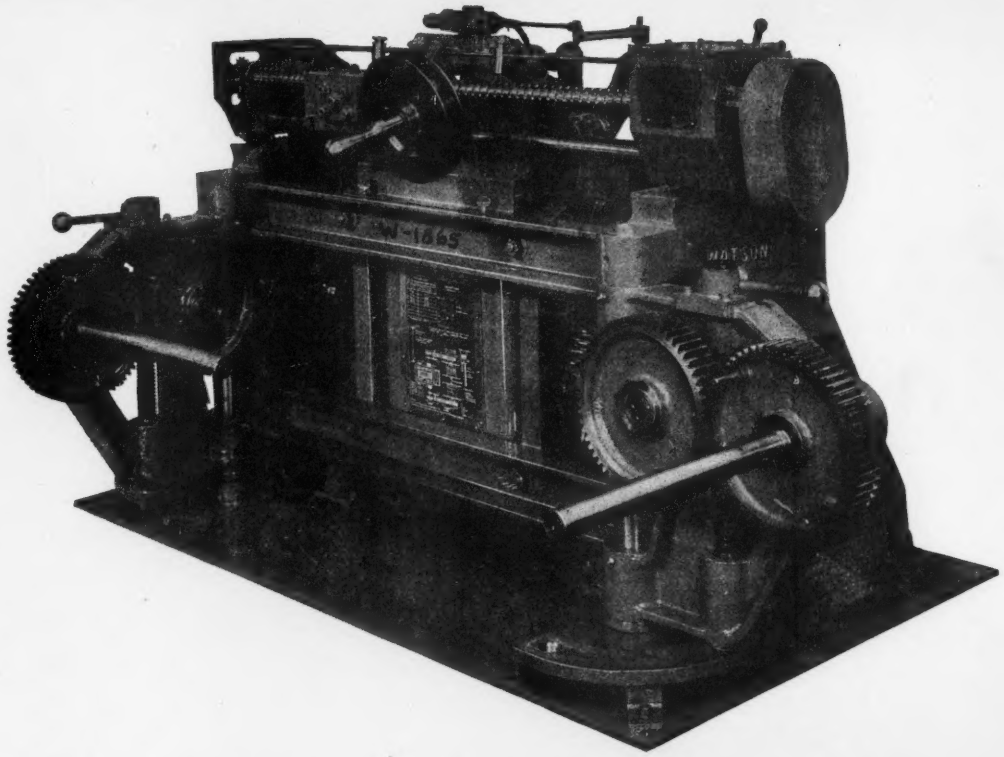
Wire & Wire Products

August, 1945

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

CONTINUOUS TAKEUPS — Type "D-C"

Available in designs and sizes for various applications, the outstanding advantages of these takeups are: CONTINUOUS PERFORMANCE OVER AN EXTREMELY WIDE SPEED RANGE AT AN EVER CONSTANT PRODUCT WINDING TENSION.



The most widely known application is in the field of high speed extrusion where continuous operation is absolutely essential. These units are equally efficient in any other "continuous" or "long-run" process where uninterrupted or constant tension reeling will speed production.

Once connected to process capstan (we supply drive) the takeup follows any delivery speed. Uniform tension may be pre-set or adjusted during run. Very slight tensions are practical.

Demanded for new installations but adaptable to all earlier installations of any make, where present takeup performance is inadequate.

Various control systems. Pneumatic system, operating from plant air supply (30 to 100 PSI) with negligible air consumption, is the most simple and commonly supplied.

* * *

Prior to submission of proposals we desire: Complete Takeup Reel dimensions, Speed Range and a General Description of the Processing Equipment.

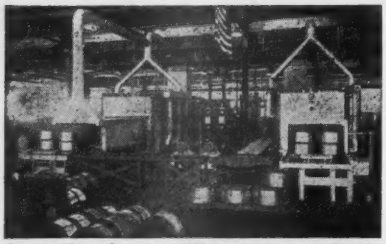
* * *

Literature & Data on request

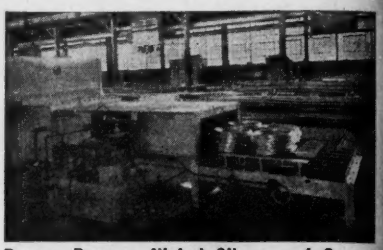
EF FURNACES

For Every Industrial Heat Treating Process

Annealing Fine Copper Wire on Spools
This EF special atmosphere continuous pusher type furnace bright anneals 800 lbs. fine copper wire on spools per hour. We build them in larger or smaller sizes as required.



Annealing Copper Wire on Large Reels
The two EF combination electric and gas fired radiant tube furnaces shown above are bright annealing 5,000 lbs. of copper wire on reels per hour, continuously.



Brass, Bronze, Nickel Silver, and Copper
Wire on spools and reels, and strip and wire in coils are clean and bright annealed, continuously, in EF pusher, bulkhead tray type furnaces similar to the above.

For Production Furnaces

For Handling Wire, Rod, Strip, Bolts, Springs
or other products in any size or shape

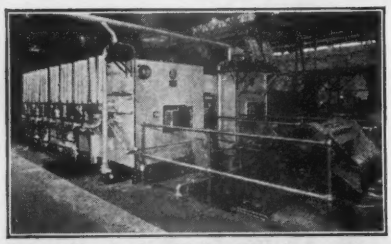
FURNACES OIL, GAS or ELECTRIC
For Every Heating and Heat Treating Process

Aluminum Brazing
Annealing
Billet Heating
Bright Annealing
Bright Hardening
Copper Brazing
Controlled Atmosphere
Carburizing
Drawing
Enameling
Forging
Hardening
Malleabilizing
Silver Soldering
Nitriding
Normalizing
Soaking Pits
Scale-Free Hardening
Quenching Machines
Ceramic Kilns, etc.
Process Heating

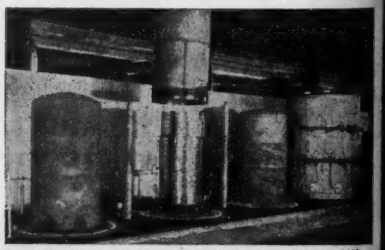
We Build the Furnace to Fit Your Job
THE ELECTRIC FURNACE CO.
SALEM, OHIO

For Production Furnaces
For Any Process or Production
Consult EF Engineers
No Job Is Too Large or Too Unusual

Annealing High Carbon Wire and Rod
High carbon wire and rod are uniformly annealed without decarburization in the above EF pit type furnaces. We build electric or fuel fired furnaces for every industrial heat treating process.



Clean Hardening Bolts, Springs, Etc.
EF chain belt conveyor furnaces are built in sizes to handle from 175 to 2,000 lbs. per hour—electric or fuel fired. The above gas fired radiant tube furnace is scale-free hardening bolts.



Bright Annealing Steel Strip, Rod, Wire
EF gas fired bell type furnaces maintain uniform temperature throughout the charge regardless of the weight or height of charge. Above installation is bright annealing cold rolled strip.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces... For Any Process, Product or Production

Copper
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